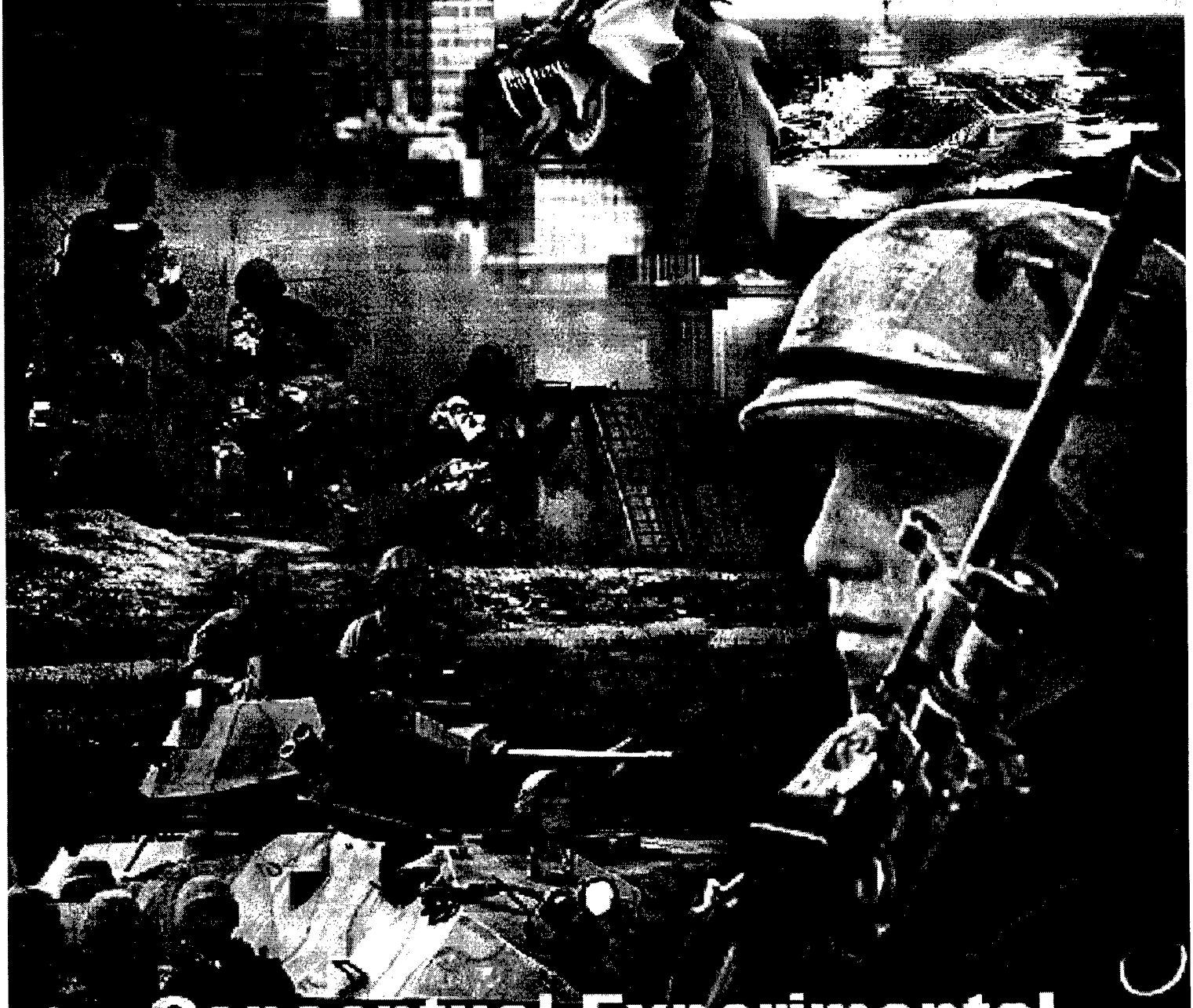
URBAN WARRIOR



Conceptual Experimental Framework

MARINE CORPS
WARFIGHTING LAB

Urban Warrior

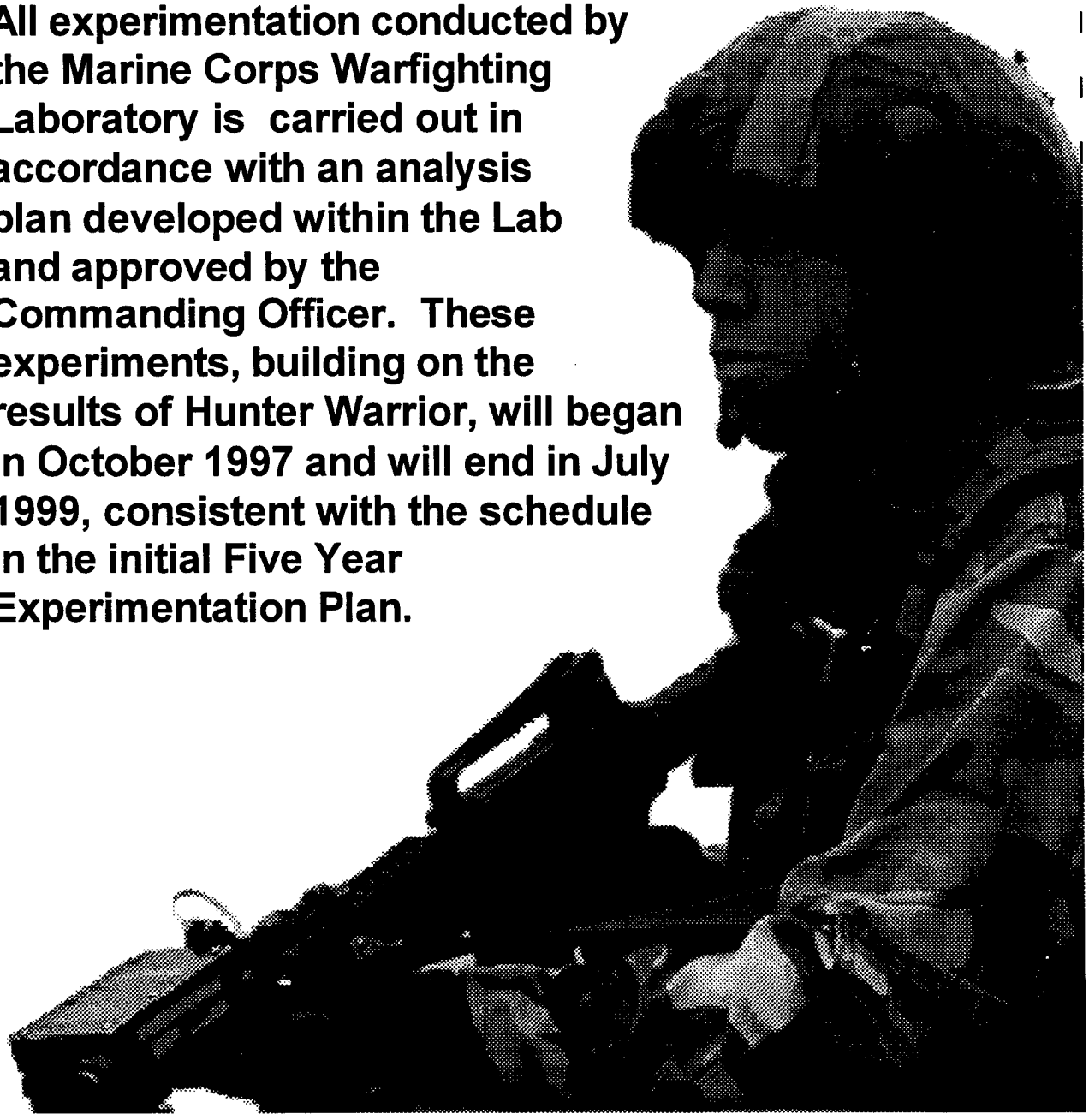
Conceptual Experimental Framework

April 1998

Table of Contents

INTRODUCTION

This document provides the conceptual basis for the Urban Warrior phase of experimentation. All experimentation conducted by the Marine Corps Warfighting Laboratory is carried out in accordance with an analysis plan developed within the Lab and approved by the Commanding Officer. These experiments, building on the results of Hunter Warrior, will began in October 1997 and will end in July 1999, consistent with the schedule in the initial Five Year Experimentation Plan.



The Five-Year Experimentation Plan

The current Five Year Experimentation Plan (FYEP) is the cornerstone document for Marine Corps experimentation. It consists of three phases of experiments comprising the Warrior series.

The initial ***Hunter Warrior*** phase of experiments, completed in the spring of 1997, explored extended, dispersed battlespace concepts. It investigated the contribution that an afloat, Marine Air-Ground Task Force (MAGTF) — enhanced with selected conceptual and technological improvements — could make at the operational level of war. Utilizing enhanced targeting, precision fires, C4I improvements and a limited deep operational maneuver capability, this force was able to shape the battlefield beyond current force employment options. Although intended as a proof-of-concept experiment employing a Special Purpose MAGTF, the results of the experiment were intended to have application in Marine Expeditionary Force-level operations as well.

Building on *Hunter Warrior*, the *Urban Warrior* experiments will investigate a range of further enhancements aimed at ensuring that forward afloat forces can effectively *cap* a crisis in urban environments. Said another way, *Hunter Warrior* identified enhancements needed now for the current operating forces. *Urban Warrior* will continue the process to create a Corps positioned to meet the challenges of an uncertain future. It will lead into *Capable Warrior*, the last phase of the Five Year Experimentation Plan. A second Five Year Experimentation Plan currently under development is tentatively scheduled to include *Information Warrior, Coalition Warrior*, and *Future Warrior*.

A squad leader directs his Marines during the Hunter Warrior Advanced Warfighting Experiment in March 1997.

"Could we significantly extend the area of influence of a modest forward afloat expeditionary force, and also significantly increase its effectiveness within that expanded area of influence?"

The *Warrior* experiments involve many agencies. Reflecting the naval nature of the forces, the experiments are closely coordinated with ongoing U.S. Navy Fleet Battle Experiments (FBE); the Military Operations in Urban Terrain Advanced Concept Technology Demonstration, co-managed with the US Army; the Extended Littoral Battlespace (ELB) ACTD; the Department of Navy Chemical and Biological Incident Response Force (CBIRF).

Other organizations involve include: DARPA's Small Unit Operations (SUO ACTD); Office of Naval Research sponsored-expeditionary warfare initiatives; Joint Counter Mines ACTD; National

Security Agency coordinated efforts to exploit commercial off-the-shelf (COTS) encryption and related C4I advances; and National Reconnaissance Office initiatives to exploit national assets.

Marine Corps-led non-lethal capabilities development and various Lab projects in concert with the National Institute for Urban Search and Rescue (NIUSAR) will also add to the range of experimentation.

Experimentation results will be evaluated within the Combat Development Process (CDP) at MCCDC for their potential. CDP actions and recommendations will be translated into new doctrine, organizations, training, equipment, and support (DOTES). In addition, our allies will be kept informed of the results of experimentation and, where possible, involved in the experiment developmental effort. To this end, officers from the Royal Navy, Royal Marines, Australian Army, French Marines and Dutch Marines have either joined the Lab staff or are actively participating in the experiments or supporting training.

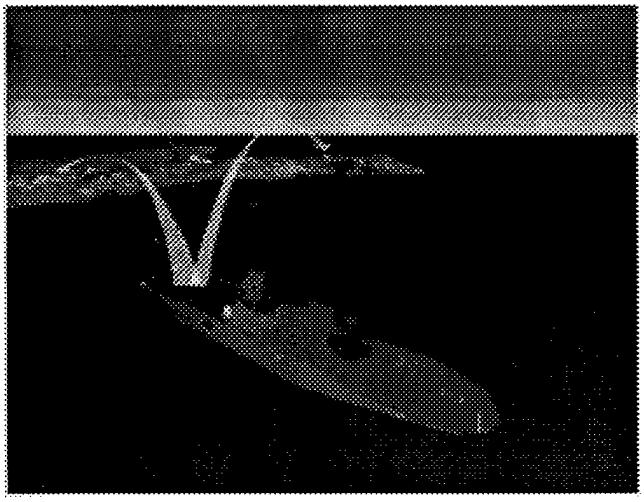
Naval Expeditionary Operations on the Urban Littoral

Naval expeditionary forces have historically carried out urban contigency operations. Since 1945, there have been more than 250 naval interventions and 90 percent have involved cities.

Demographic trends make it a near certainty that future operations will involve more of the same. Population models estimate that 70 percent of the world's population will live in cities by 2025. Seventy percent of these cities will be located on the world's littorals.

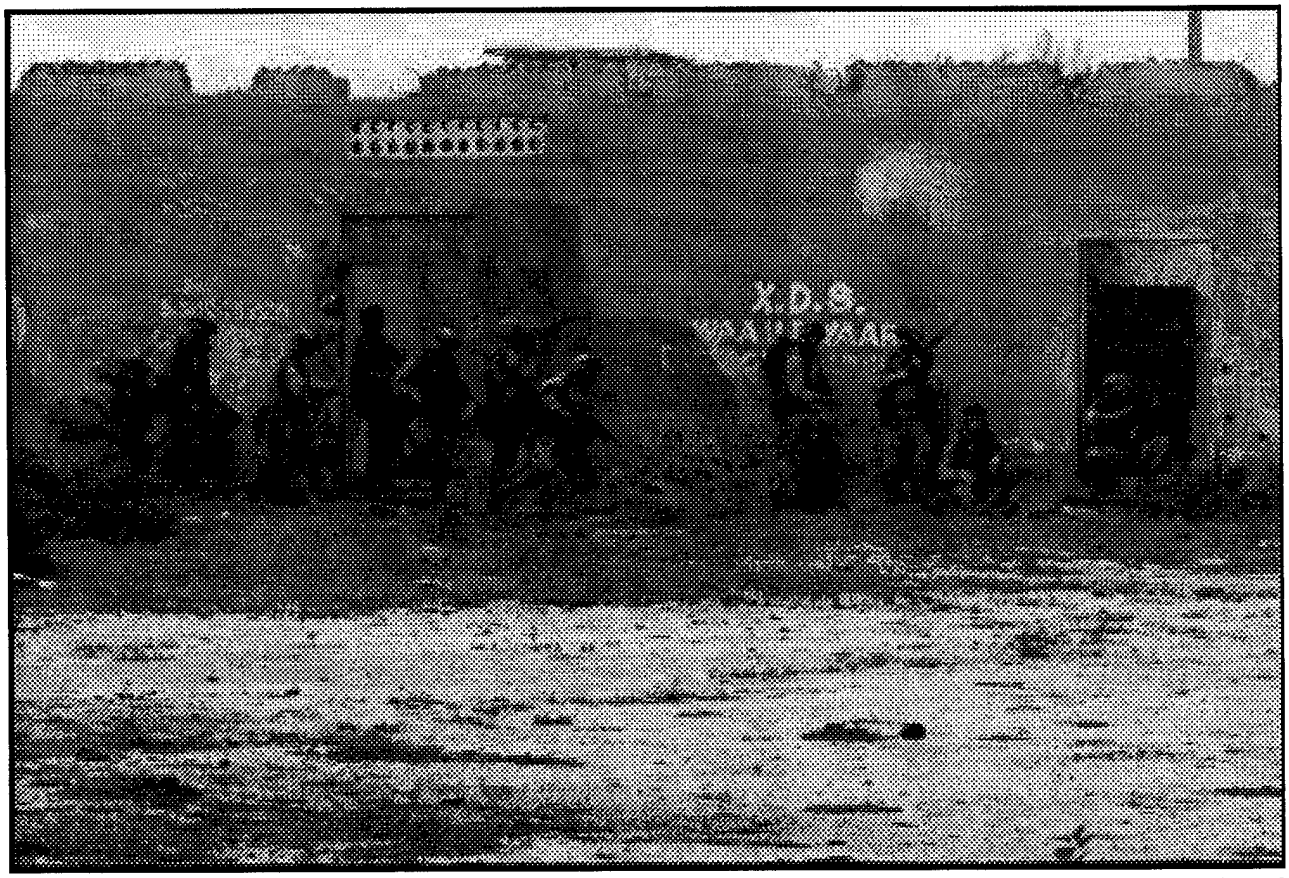
Like other expeditionary operations, urban operations will be characterized by the application of operational maneuver from the sea (OMFTS) — and its supporting concept of ship-to-objective maneuver (STOM) — enabled by new concepts and technologies. These operations will be executed on the littoral battlefield that includes the extended naval battlefield (with its landward and seaward urban approaches) and the constrained (urban) battlefield.

Exploiting the sea as maneuver space, naval expeditionary forces will be prepared to execute a wide range of contingency operations without establishment of, or dependence on, facilities ashore. Viewing the urban littoral as a single naval battlefield ashore and afloat, these naval expeditionary forces will employ a maneuverist approach to collapse cohesion, erode will, and/or attrit enemy capabilities to create a dilemma that adversaries cannot effectively deal with.



Building and maintaining supply dumps, depots and combat power ashore will be extremely difficult in many future conflicts. Urban operations in the future will be characterized by the application of Operational Maneuver from the Sea (OMFTS) and its supporting concept of Ship-to-Objective Maneuver (STOM).

As described in the *Naval Operational Concept*, both MAGTF and Fleet elements will comprise maneuver components within an integrated naval force. These forces will contribute to joint and/or combined objectives. Naval forces generate decisive force by using tailored combinations of MAGTF, fleet, and joint force capabilities through the integration of organic force projection capabilities, new technologies and new concepts of employment.



Naval Expeditionary Forces do not reduce cities. They penetrate urban areas to execute a discrete set of operations in the face of difficult conditions.

Potential changes in operating force capability, concepts, and organization, as well as in supporting establishment roles, have been identified for experimentation. Examples include employment of a cellular MAGTF command element, a new staff decision process, precise targeting and fires, new maneuver-based urban tactics, dispersed seabased sustainment (including unmanned vertical delivery of supplies), detailed urban database preparation and exploitation, robotics, seabased C4I, responsive sensor employment in the urban canyons and their approaches, widespread use of non-lethal technologies, and integrated operations involving naval forces in combination with new organizations such as the CBIRF.

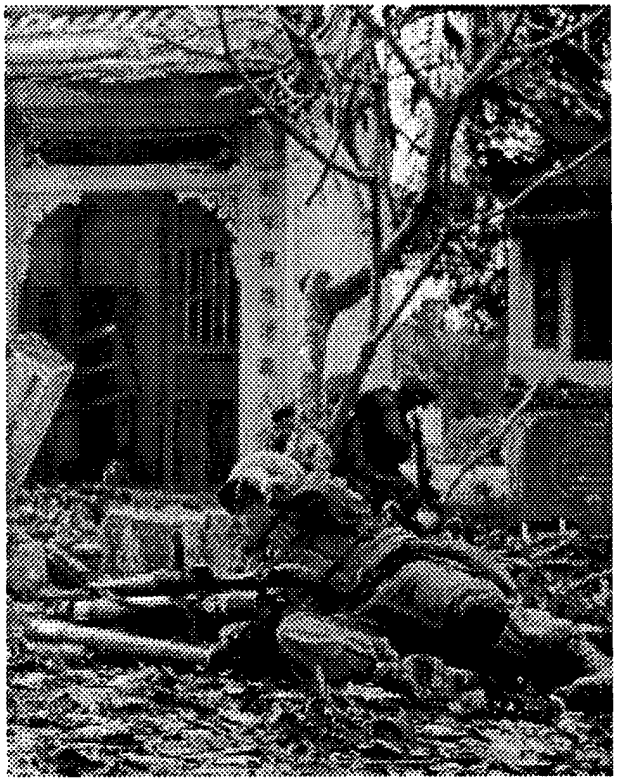
Naval expeditionary forces will normally be employed as elements of a JTF or as forward elements of a larger joint force executing short warning, contingency response. In general, naval expeditionary operations will be seabased and will be executed as operational maneuver from the sea. They will involve widely separated elements ashore and afloat and will require intensive intelligence and database support throughout. These operations will involve extensive use of information operations and be highly dependent on small unit initiative, an understanding of intent, and an aggressive opportunism at all levels. These operations may last only a few days or may consume months.

During this time the seabase will provide the basis for force projection and a base for air cushion and aviation mobility assets. The seabase will also provide an offshore safe haven for central C4I and sustainment capabilities and a significant share of integrated naval/joint sensor and fires capabilities.

In executing these urban littoral operations, naval expeditionary forces will not reduce cities. Instead, they will penetrate urban areas to execute a discrete set of operations in the face of difficult conditions. The mission, duration, and scope of these operations will normally be limited. However, these operations can run the gamut from intense combat to humanitarian operations.

The Constrained (Urban) Battlespace

The Marine Corps has an extensive history of operating in cities. Within the last 30 years, Marines have fought in areas as diverse as Hue City, Beirut, Khafji, Mogadishu, and even Los Angeles. Increasingly, it has become evident that Marines must have the capability to operate effectively in urban, near urban, and open areas.



Marines at the Citadel, a key point in the 1968 Battle of Hue during the Vietnam War. Hue was the last major urban battle Marines participated in. Photo courtesy of Don North.

Isolation of an urban area may well involve dispersed operations on an extended battlefield (a la *Hunter Warrior*). Operations within the dense urban area are likely to be focused on widely separated enemy strong points and key facilities — such as communications complexes and selected avenues of approach and egress. Operations at sea must be designed to support both of these applications simultaneously.

Operations in cities and on their approaches will involve maneuver and close range engagement in an environment characterized by concentrated cover, concealment and obstacles. Accordingly, urban terrain favors the defender. In this constrained battlespace, units will maneuver on four planes: (1) in the subterranean plane using the sewers and subways, (2) on the surface plane using the floors of the urban canyons, (3) within the structural plane from building to building, and (4) in the air above the city.

The urban infrastructure can be both ally and enemy. While providing cover, concealment and significant sustainment potential for the MAGTF, it is also a formidable adversary. Urban environments limit large-scale use of indirect fires. Structure densities and interrupted lines of sight vastly complicate communications and targeting. Building densities also require precise small unit location capabilities within a three dimensional puzzle. Concrete and other materials contribute to spalding, ricochets and fragment wounds. Structural density, electronic interference and industrial obscuration reduce the utility of joint, overhead sensing systems.

At the same time, the squalor and highly inflammable nature of building materials within many Third World urban areas — coupled with the wide use of propane or natural gas for heating and services — creates a risk of catastrophic fire.

Compounding the problem for Marine forces in the urban battlespace is the risk that dense urban terrain can consume Marines in *clearing and holding*, physically and tactically exhausting both individuals and units. Accordingly, in some cases *exhaustion* — or its prevention — may be one of the critical vulnerabilities worthy of consideration in a maneuverist approach to this complex battlefield.

The wide range of possible scenarios demands that MAGTFs be prepared to execute limited objective operations in neutral, friendly and

hostile areas. Isolation operations may be required on key terrain and specific avenues of approach to or egress from cities. Urban penetration operations will introduce forces to seize and control key facilities or to selectively destroy targeted armed forces. Supporting operations designed to collapse essential functions will accompany or precede the main effort. Often, operations will be designed specifically to influence and assist non-combatants. Additionally, chemical-biological consequence management operations may be mounted in response to the use of weapons of mass destruction in urban areas.

Because it supports asymmetric operations, the urban battlespace offers a special attraction to non-state fighters, terrorists, and guerrillas. As discussed earlier, urban characteristics can blunt the effectiveness of many current military technologies and it offers ready-made media and public exposure to potential foes. It provides a broad stage for the use of weapons of mass destruction (WMD). In fact, the only question seems to be *when* – not if – we will need to employ CBIRF and related chemical-biological response capabilities on the urban littoral.

The ability to respond to the chemical and biological weapons of mass destruction is a necessity for Marines operating on the future urban littoral.

Finally, the urban environment affords an enemy the ability to *blend* into the non-combatant population, presenting special challenges to operating forces.

Noncombatants and refugees may be as formidable a factor as the urban infrastructure. Refugees are likely to clog roads, inland waterways, airfields and ports as well as presenting commanders with humanitarian support issues. The presence of large numbers of people who are nominally *not involved* in the conflict becomes a significant factor which shapes rules of engagement, small unit leader decisions, weapons applications, information operations, sustainment planning and *end state* definition. In fact, a means to attain mission accomplishment may be the successful winning of non-combatants' *hearts and minds*. Accordingly, urban operations planning must consider actions to deal with the support of indigenous non-combatants. Plans must include policies for dealing with the variety of humanitarian issues of non-combatants in a combat zone to include the potentially overwhelming responsibility that could be assumed by the U.S. military forces for food, water, shelter, medical care

Urban operations will feature many different missions and Marines must possess humanitarian skills as well as warfighting skills.

Successfully dealing with non-combatants — the winning of hearts and minds — will play an important role in urban operations.

and utilities for the inhabitants of an urban area as a result of military operations.

In addition, actions will be planned and executed to take full advantage of non-lethal technologies and the potential offered by information operations. Non-lethal technologies will be employed at close range — and potentially from over-the-horizon by aerial delivery. They will be used for denial and blocking missions, crowd control, access limitation tasks and economy of force missions to free forces for elsewhere.

Experimental Tactical Concepts

Urban terrain offsets many of the strengths in the traditional American way of war. The effectiveness of satellites and reconnaissance assets are severely reduced in the dense clutter and density of the terrain. Firepower inflicts collateral civilian casualties and crumbles the infrastructure. The rubble in turn prevents rapid maneuver and affords the defender increased protection.

Messy, entangled and chaotic, urban warfare is the opposite of the long range precision weapon engagements that characterized Desert Storm. In city streets, engagement distances are generally short and identification of friend from foe and non-combatant is inherently difficult. Although the combined arms approach remains central, the emphasis clearly is on the infantry small unit leader who must be given the tools to replace combat characterized by attrition and perseverance with maneuver and improvisation.

In the past, there were no technological tools to assist the primary battle leaders — squad and platoon leaders — in maintaining situational awareness. In the future, however it may be possible for every Marine to have radio commu-

Marines patrol through a crowded alleyway in Mogadishu, Somalia in 1993. Devising new methods to meet urban challenges is the purpose of the Lab's experimental tactical concepts.

nications, to know precisely where each Marine is at all times, to be able to track all other Marines in his area of interest and to receive minute-to-minute updates on the location of enemy positions and such key information as zones of grazing fire. As a result, units of varying sizes can be tailored to the situation and dispatched simultaneously to different locations, with their actions coordinated as necessary through a concept of an *on-scene tactical commander* — all operating within the intent and understanding of the overall MAGTF Commander.

This concept of command and control differs greatly from the current system of command and control that is pyramid-based. Currently, the C2 concept is that each level reports to the next higher level — squad to platoon, platoon to company — and in turn receives instructions on what to do. While *commander's intent* means that subordinate leaders do have degrees of freedom to exercise initiative, they are still subordinate. In heavy contact they are expected to report and to receive instructions from the next higher command, which is also the pathway to reinforcements and supporting arms. The next higher level makes the decisions about additional resources. In addition, higher command offers more experience, a valuable commodity on the battlefield. Small units today have strong incentives to stay tucked inside the close control of higher headquarters.

Accordingly, it is not enough to experiment with technologies which permit a different approach to urban combat. Instead, experimentation must address both tactical decision making and the impact of improved communications and information on urban tactics.

The squad is the basic maneuver element in the urban jungle. *In fact, the squad leader will become the lowest level battle leader capable of independent operations on the constrained urban battlefield.* In the tactics envisioned for experimentation during *Urban Warrior,* the emphasis will be on the squad leader as the tactical decision maker. He will make the decisions to request and then direct reinforcements or supporting arms.

As a tactical decision maker, the squad leader must be more than simply a tactical employer of his squad. As in the case of platoon and company commanders, these experimental tactics emphasize the opportunism of tactical commanders operating independently and using technology to coordinate with other forces and supporting arms as necessary.

The major difference between these tactics and current tactics is in command and control. The commander at the point of contact — whether at squad, platoon, or company level — assumes the role as *on-scene tactical commander* until relieved. He becomes the supported commander with higher level or reinforcing adjacent unit leaders acting in support of the on-scene tactical commander. If additional ground forces are needed, the on-scene tactical commander requests them and if dispatched then he assumes tactical direction of their employment. A squad leader calling for assistance could conceivably use his palm-top computer to provide an overlay to reinforcing squads to direct their tactical scheme of maneuver. If the fight expands and a lieutenant or captain arrives on-scene, the senior officer could assume command once fully acquainted with the tactical situation and able to assume tactical control

Implementing this concept requires self-confident, experienced squad leaders. This means squad leaders who are both tactically proficient and capable of the tactical decision making normally associated with school-trained officer platoon commanders. FMFM 6-1, *Command & Control*, stresses that such decentralized decision making is a basic requirement for accelerating battle tempo and operating inside the enemy's decision making loop.

Implementation will require small unit leaders that are not only tactically proficient, but also products of a different training program that builds self-confidence in tactical decision making skills. Squad leaders should be expected to effectively assume the role of on-scene tactical commanders rather than to report and await orders when faced with the unexpected or the need for external support.

The Marine Corps Warfighting Lab's approach to urban warfare is to experiment with tactics and technologies which encourage small unit confidence and decision making. On-scene tactical command of simultaneous non-contiguous engagements is the conceptual means to escape the trap of a linear attrition approach to urban combat. What pulls together the threads of this approach is a change in the locus of decision making, a downward shift, implicit in Marine Corps doctrinal publications but not yet achieved generally in practice. The degree of centralized or decentralized command and control should be on a sliding scale dependent on the combat situation. Improved tactical skills and decision making at the squad leader — when coupled with improved communications and access to information — are intended to increase the flexibility of the commander to choose to operate using dispersed tactics and simultaneously attack the enemy at several key points, thus accelerating battle tempo beyond the ability of any opposing force to cope.

"To give cohesive squads skilled leaders"

To impart skills to a squad leader to enable him to be a:

- **Leader**
- **Decision maker**
- **Tactician**
- **Trainer**

A review of urban warfare history reveals four common features. First, with few exceptions, forces attacking cities surround and isolate the target city, then conduct a linear, methodical sweep of the city to clear it of enemy forces. Second, this linear sweep of the city usually results in numerous casualties — enemy, friendly and noncombatant. Third, there is an extremely high consumption rate for small arms ammunition and grenades. Fourth, combat in urban environments is extremely exhaustive, both physically and mentally.

Several new tactical concepts are under development as a basis for exploring dispersed tactics in the urban battle. *Naval advanced force battlespace shaping operations* focuses on identification of pre-operational preparation — particularly in reconnaissance, surveillance, targeting, and the establishment of selected support capabilities to prepare for future expeditionary operations. *Urban penetration* and *urban thrust* are designed primarily for use in mid-intensity conflict while *urban swarm* may have greater applicability in lower intensity conflicts. (This should not be construed as prohibiting their use as appropriate.) *However, continuous attack* is a supporting concept. All of these concepts are based on the precepts of maneuver warfare, and seek to explore the potential utility of dispersed, non-linear operations. *Active urban defense* describes efforts to apply the concept of maneuver warfare and coordinated dispersed operations to defensive tactics in the urban environment.

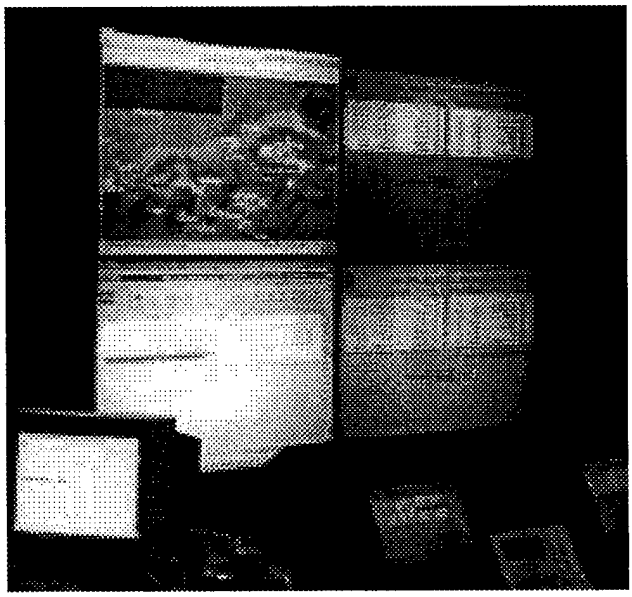
Note: the offensive tactical concepts developed below do not constitute the totality of potential options. Another construct proposed for consideration is an adaptation of the Finnish Motti tactics in which the urban area is subdivided (and potentially isolated into zones by the use of non-lethal obstacles) and the opposing forces destroyed in turn in those zones of interest to the MAGTF commander.

Naval Advance Force Battlespace Shaping Operations

The concept of *naval advance force battlespace shaping operations* is designed to focus efforts on preparing a littoral area of interest for future tactical operations. In its initial stage the concept focuses primarily on collecting and cataloging critical elements of information into data bases immediately available to the naval task force and embarked MAGTF.

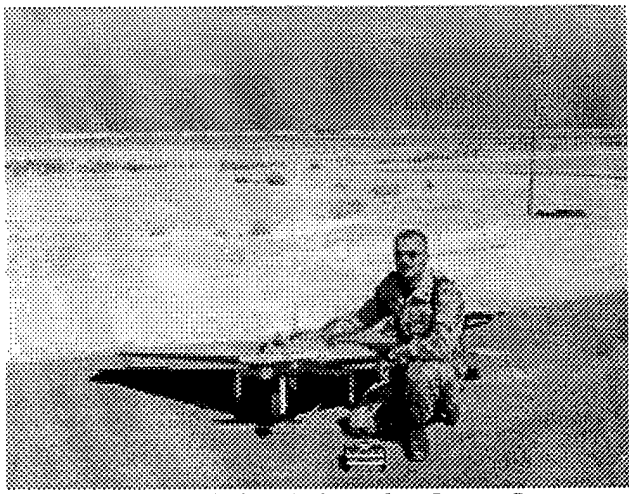
Central to the development of databases is the concept of reach-back from the forward naval task force to intelligence and support agencies within the United States or to our allies within theater as applicable. These external agencies should not only provide access to all known intelligence products concerning the area of interest, but also assist in cataloging the vast amounts of unclassified information concerning the area, its infrastructure, and its inhabitants.

The growing world urbanization makes up-to-date information — to include infrastructure information concerning road systems, bridges, underground systems, building blueprints, energy grids, communication systems, current aerial photographs and maps — especially important. The key to effective reach-back is the rapid and efficient cataloging of information products for the direct use of forward forces in their planning and tactical operations.



Using reach-back capabilities to build urban-specific databases is the first step in advance force operations. Reach-back resources, available through secure World Wide Web sites, offers the ability to coordinate intelligence resources and gather unclassified information concerning the area of operation.

A second category of advance force battlespace shaping actions is the employment of national and theater sensors to develop understanding of the future operating area with a focus specifically on key areas of information. Where possible, direct download of sensor products is desirable — and must be established and practiced as a priority during advance force battleshaping actions. When direct access is not possible, identification of precise products that could be available from intelligence agencies as a result of national assets must be identified and the products requested.



Unmanned Aerial Vehicles (UAVs), such as Dragon Drone, can be operated at the MEU-level and will improve information collection for advance force operations.

A third category of actions is the expansion of information coverage through the use of organic information collection assets to include manned aircraft, UAVs, UUVs, submarines, reconnaissance and special operations forces. In some cases, it may be possible to introduce forces into the region — either openly or covertly — to coordinate with country teams or friendly militaries within the region.

Coordinating or developing logistical support for future operations may be a significant concern of the initial insertions of personnel and forces into a future operating area. Arranging for logistical support may take the form of host nation coordination, contracting for specific services, or the development of clandestine caches of equipment and supplies needed to support the future employment of combat forces operating on an extended littoral battlefield in non-contiguous, dispersed units.

Should the advance force be operating in the role of forward presence force prior to the outbreak of hostility, they may also be playing a key role in the shaping of political and military perceptions within the region. In these cases, battlefield shaping operations may take the form of exercises and demonstrations of military effectiveness to serve as both a deterrent and stabilizing force within a volatile region — or as a demonstration of US political commitment to embattled allies or friendly states.

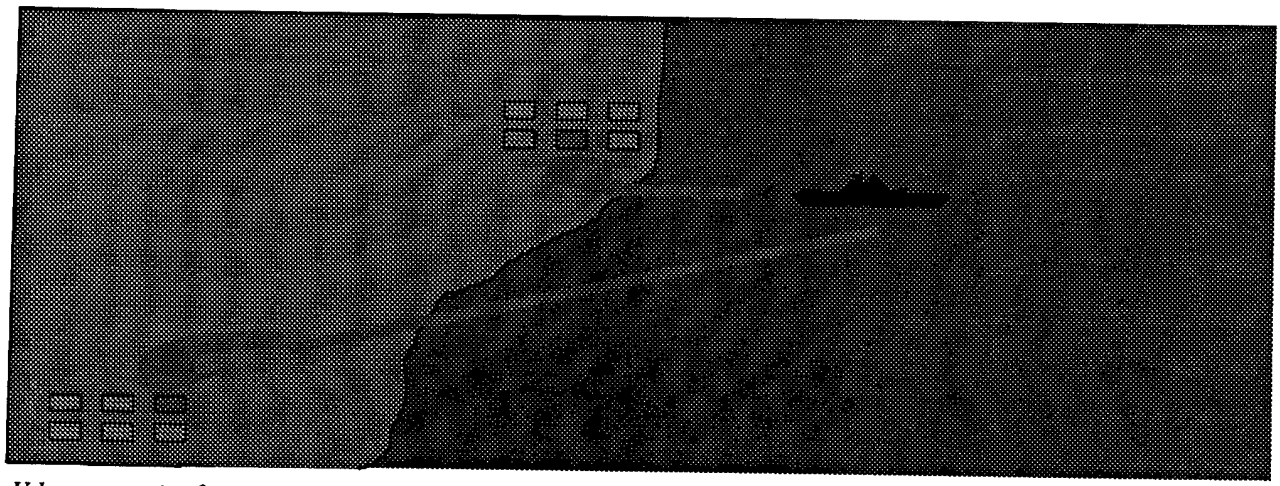
Urban Penetration

The urban penetration tactic is designed for operations against clearly defined objectives, either enemy or terrain. Although at first glance focusing on terrain may seem to contradict maneuver warfare, there are exceptions to every rule.

The urban battle has several factors which the open battlefield usually does not. The most notable of these is the presence of large numbers of non-combatants. Second, is the presence of man-made features — power plants, water plants, food storage and distribution centers — which may provide leverage in establishing control over the

Urban Penetration

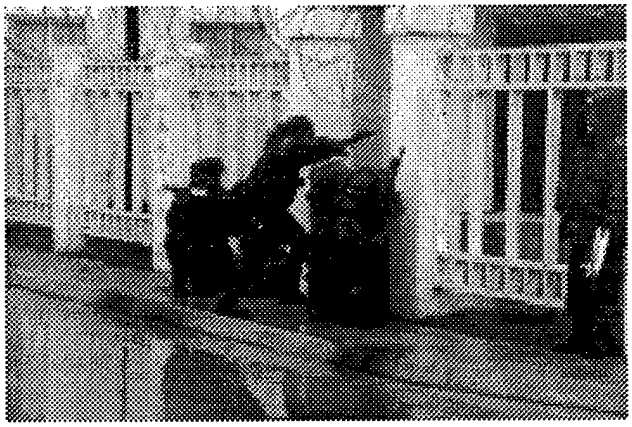
- Seeks to exploit urban characteristics
- Precise attack to seize specific objective
- Raid without retrograde
- Withdrawal could be to a second objective



Urban penetration focuses on clearly defined objectives, either enemy or terrain.

urban environment. The ability to rapidly seize these facilities and establish control over them may be critical to operations in an urban environment.

The urban penetration tactic is designed to quickly maneuver to the objective area and establish control in a dispersed and non-contiguous battlefield. Urban penetration requires sufficient mobility to move quickly to the objective area, seize it and isolate and protect it from the enemy and non-combatants. Movement to the objective area can be either surface, subsurface, or above the surface. The unit must possess sufficient firepower and protection to arrive at the objective area in sufficient force to seize the objective and establish control. Stealth will often be the preferred movement tactic in order to maximize force protection and surprise.



In penetration, the attacking force must have the ability to both seize and defend the objective area.

Upon arrival at the objective area, the penetrating force must move directly into the attack and seize the objective area. This implies movement in combat formations. After seizing the objective area, the attacking force must move to isolate and defend the objective. Forces conducting the urban penetration must have the necessary combat skills to allow them to conduct an opposed movement to the objective area, an assault of the objective and an immediate defense. This must be done in a maneuver context which permits maximum flexibility and initiative while supporting the commander's concept and intent. Attacks will likely be conducted on multiple axes of advance by dispersed units, as well as on several dimensions (subsurface, surface, structural, or above the structures).

Isolation, and/or defense of the objective, must include provisions for hostile forces as well as non-combatants. This implies a potential utilization of lethal as well as non-lethal weapon systems. The defending force must be sufficiently robust to accomplish its assigned mission. However, as with attacking forces in *Hunter Warrior*, defenders should be sufficiently trained and equipped to leverage the firepower inherent in the MAGTF, such as supporting tactical aviation and a naval surface fire support.

In conducting a penetration attack on an enemy force, the commander may choose to withdraw once the objective has been achieved. In this case, the penetration will take on many of the characteristics of a raid and should be executed accordingly. However, the withdrawal could take the form of a successive penetration to a second objective.

Note: based on historical precedent, the need for a thorough exploration of tactics, techniques and procedures for the relief or extrication of a penetrating unit must be addressed as part of the tactical assessment.

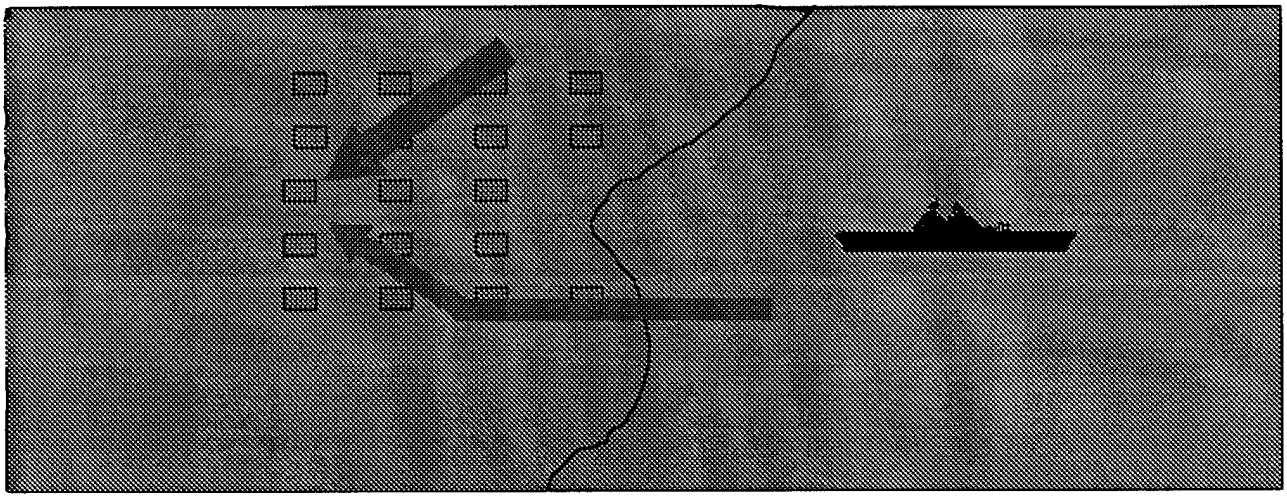
Urban Thrust

The urban thrust is a tactical concept focused on achieving an assault against the enemy on a narrow axis of advance. The thrust maximizes combat power at the point of the attack. It can be described as an arrow or dagger thrust into the enemy defense. As this narrow attack is occurring the axis of advance is defended in order to refuse the flank to enemy attacks. Potentially, this can be accomplished through a combination of forces, sensors and lethal/non-lethal barriers.

The urban thrust can be conducted on multiple axes simultaneously. These attacks should be conducted in parallel and be mutually supporting. When possible, the thrust should be conducted on an oblique axis to the street, which should help reduce

Urban Thrust

- Narrow Assault
- Axis of advance defended by forces, sensors, or ?
- Conducted oblique to streets using "Mouse Holes" for hiding access
- Shifting axis of attack
- Multiple axis of attack



Urban thrust envisions attacking the enemy along a narrow frontage with combat power maximized at the point of attack. The axis of advance in this narrow attack must be defended to refuse the flank. Potentially, this can be accomplished through a combination of forces, sensors and lethal/non-lethal barriers.

exposure in what has been the primary killing zone in urban combat. However, this tactic results in the need to breach buildings at their strongest structural point.

As the thrust proceeds, commanders conduct periodic shifts in the axis of attack in order to confuse the enemy and avoid establishing a pattern. This implies the ability to coordinate within the urban environment and establishes a requirement for coordination based on location and timing, and/or communications and location. As with all maneuver, knowing the commanders concept and intent are of paramount importance down to the fireteam/squad level is essential.

The thrust, conducted on multiple axes, presents the commander with numerous options. Thrusts can be made to a certain point, whence the commander can order one thrust to serve an anvil, while a second thrust acts as the hammer. Thrusts can also be directed that have one line remain stationary while a second thrust line conducts a right or left turn to complete an encirclement.

A variation is the use of a *weave* style that would move on narrow directions of attack through the infrastructure (conserving forces, rotating units to maintain relative freshness) then start on a new direction resulting in isolation of the enemy into pockets for destruction. During the employment of this tactical concept, enemy forces not directly engaged would be subjected to indirect fires, raids, probes and feints intended to reduce morale, cohesion and unity, thus limiting the enemy's ability to regain the initiative. The intent is to concentrate forces at the

time and location of the commander's choosing to achieve decisive operational results (such as the destruction of the enemy forces, the withdrawal of opposing forces, or the occupation of significant infrastructure within the city).

The options are many and varied. The concept's intent is to avoid the linear assault, while confusing the enemy, forcing his flanks, isolating his forces and deceiving him as to the true nature of the attack. Ideally, this will force his withdrawal and exposure without the necessity of a room-by-room clearing of the city. If forced to withdraw, the resulting exposure can be exploited by tactical aviation and indirect firepower cued by a combination of overhead national reconnaissance, surveillance, targeting architecture and tactical sensor systems. Refusal of the opposing force to withdraw can be countered by isolation and his reduction or elimination by siege.

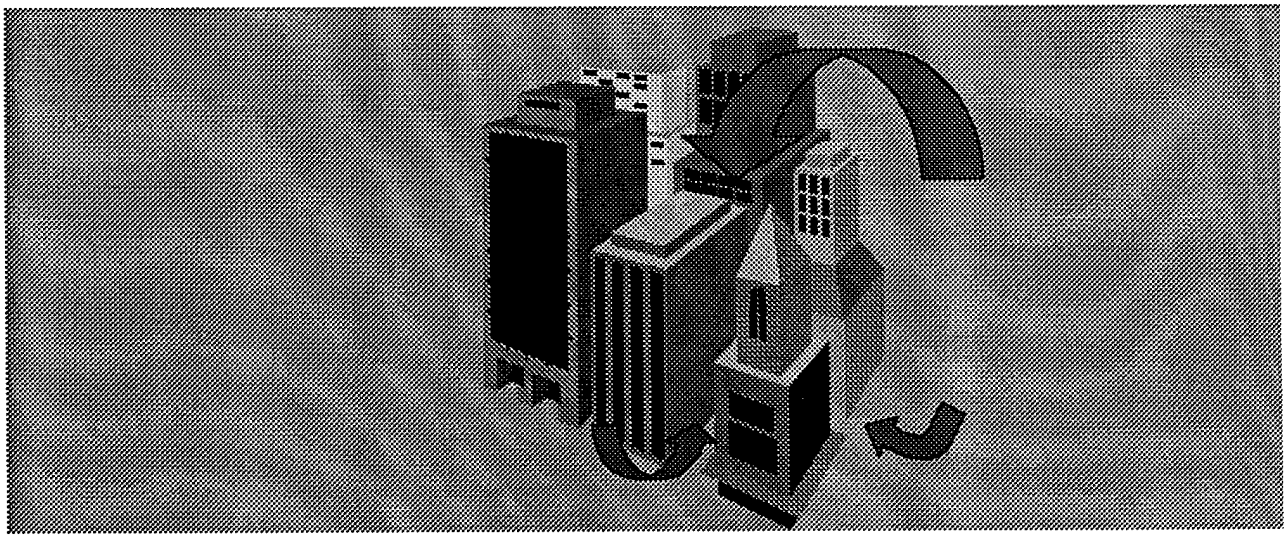
Urban Swarm

Urban swarm is similar to the tactic used by police responding to an emergency which requires backup. The tactical concept envisions numerous fireteams or squad-sized units operating in a dispersed, non-contiguous fashion in the urban environment. As these units patrol their assigned area, they must be continuously prepared to respond rapidly to calls for assistance by neighboring teams. Whether they can respond to a call for assistance will be dependent upon their own situation and distance from the supporting request.

As a call for assistance is transmitted, the requester should give an estimate of his requirements. This request would be transmitted to all other teams on the net and higher headquarters

Urban Swarm

- Low Intensity Conflict?
- A single incident or an area
- Command & Control
- Fire Support Coordination Measures
- Size of units responding



The urban swarm tactic is similar to the response police departments use in an "officer down" situation. The tactic envisions numerous squads patrolling within a city and responding, as directed, to a squad in contact.

— to include the seabased Experimental Combat Operations Center. The battlewatch captain would then direct the appropriate teams to respond to the request and adjust other units to fill or cover gaps that are created.

Alternative methods could include the teams closest responding without direction, while simply reporting their intention to respond. As situation awareness improves at all levels, where all units have the current location of all adjacent units in near-real time, coordinating this tactic of response without fratricide will increasingly become more feasible.

Command of teams responding to a request could also take several forms. The commander or leader of the unit requesting support, as the one with the best awareness of the situation, could assume command of responding units as the *On Scene Tactical Commander*. Other options could include the senior commander within the immediate area of operations assuming command, or in some instances, a command element being sent to the scene by the battlewatch captain.

Another option for command in a crisis is to have units conduct the swarm tactic as a version of the platoon patrol base. In this case, the platoon commander and platoon sergeant would be in the vicinity of the platoon patrols and these personnel would be on scene in case of emergency. This process could be carried up to the company and battalion levels with appropriate levels of command available to meet the situation. What must be avoided, however, is *over commanding*.

The key to this tactic is speed and flexibility. The requesting leader must be able to quickly and concisely inform the responding units of the situation and maneuvering them to advantage as they arrive on the scene. The responding units must also have the flexibility and training to enter an emerging situation seamlessly. Implicit in this concept is the capability of junior leaders to assume increased levels of responsibility and command. The tactic also requires the ECOC to be able to respond to the crises and to adjust forces in the gaps that are created.

What must be avoided at all costs is establishing patterns. If units respond to crises in redundant or similar patterns, the enemy will quickly observe this and easily create crises in order to lure responding units into ambushes or exploit the temporary void created on the battlefield by responding units.

Continuous Attack

Many factors can lead to success or failure on the battlefield. Among these are physical and mental fatigue. The rigors of combat – carrying heavy loads, running, loss of sleep, climbing, digging – coupled with the mental stresses of fear, rage and exhilaration, can in a short period of time reduce physical and mental capabilities in individuals and units.

This fatigue can lead to failure on the battlefield. Military organizations that can exploit fatigue, however, may gain significant advantages. The unit that is effectively conducting continuous operations can place significant physical and mental stress on an opposing force and render them unfit for combat.

The theory of continuous attack is simple, but the execution is difficult. In short, continuous attack is around-the-clock offensive combat. The attack is gained and maintained until the enemy is defeated.

To conduct continuous attack, a unit must organize for sustained and surge operations. At any given time, a percentage of the force is in the attack applying unrelenting pressure on the

Continuous attack is predicated on gaining and maintaining momentum in order to wear an enemy out.

enemy. To maintain the attack and hence the pressure, units in contact will require rotation at specified intervals. Units rotated from the attack must then go into a rest, recovery and maintenance cycle before again being rotated into the attack. Units not in the attack cannot be used for other operations or details. They must gain the required rest in order to be placed back into the attack fresh. A variation of *aviation crew rest* principles may be the answer.

The one exception to the above is surge operations. As the battle unfolds, the commander must continually analyze the situation and gauge the combat effectiveness of his opponent. Indicators must guage an enemy's physical and mental capacity. Ideally, a surge effort will be focused in a culminating offensive stroke that is unleashed when the enemy is at his weakest.

Developing the capability to conduct continuous attack will require a major shift from the current practices. Although most commanders attempt to conduct 24 hour operations, ground operations are usuallylimited to 12-16 hour stretches, with rest periods between efforts. Further, main attacks are typically "weighted" and a minium reserve force primarily for exploitation of success is maintained.

To successfully conduct continuous attack, units must be prepared to rotate forces in the attack. The percentage of the force employed at any one time may vary significantly. As a general rule, no more than 60 percent of a force should be committed to continuous attack at any given time. Whatever the split, the emphasis must be on maintaining continuous pressure on the enemy. While resting forces to continue the attack, the intent is that the enemy force is denied the opportunity to rest or reorganize due to the need to defend against our unrelenting pressure.

Technology may contribute to the conduct of continuous attack. The use of sensors, both close in (squad level) and extended, can enhance force protection efforts and reduce readiness levels of units in rest periods. In the same fashion, the use of autonomous fire support systems such as the Dragon Fire 120mm mortar can reduce the footprint ashore by eliminating the need to man and defend fire support positions, increase the supporting fires options for commanders during maneuver, and reduce the footprint of non-maneuvering forces ashore.

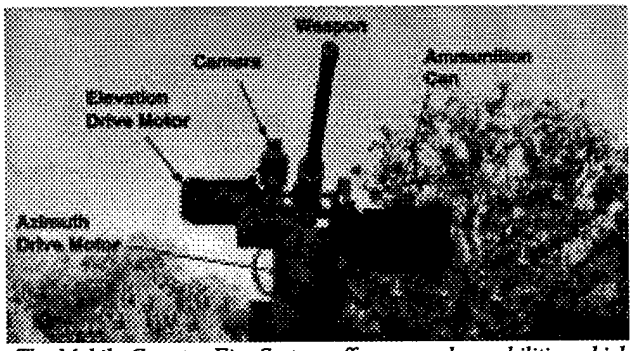
Adoption of continuous attack as a tactical imperative will require a fundamental shift in tactics and training. It will require unit and individual training to emphasize relief in place of engaged units and covert withdrawals. Professional schools will need to emphasize operational planning that utilizes only a portion of the force at any given time, and indicators of enemy readiness and mental condition, to identify when to most effectively seek decisive engagement.

Active Urban Defense

An often used truism is that *the best defense is a good offense.* It is also true that the attacker — primarily because he normally has the initiative to engage where and when he chooses — generally will prevail over a static defense even though the defender has the advantage of fighting from protected positions. Once the defensive positions are penetrated by the attacking force, the defender is generally forced to withdraw to the next position. There are numerous reasons for the attacker prevailing, the most prevalent being that the defender dares not concentrate all his force in a single location for fear of destruction via indirect fires or isolation by the attacking force. The attacker by contrast can select his target or objective and concentrate the requisite force to achieve his goal.

However, there are times — even if only to pause and give rest to U.S. forces — that it is desirable for expeditionary forces to assume a defensive posture. The complexity of defending within the urban environment is compounded by the diversity of the terrain, the presence of non-combatants, the segregation of units due to structures, and the multi-dimensional aspect of the environment (surface, sub-surface, cross canyon, supra-surface). As in the attack, the conduct of the defense is more difficult in the urban environment than in more open terrain.

The *active urban defense* envisions combining the best attributes of both the defense and the



The Mobile Counter Fire System offers several capabilities which can enhance active urban defenses. Mutually supporting direct and indirect fire assets will be a major player in active urban defenses.

attack. In short, maximizing the advantages of each. Under this concept, the defender arrays his forces to cover the desired area and its approaches. Minimum force is deployed much in the manner of a screen — with mutually supporting fires from overwatch positions. These units are enabled with supporting fires, adjacent units and a reaction force to assist in the reinforcing critical points if required.

Fundamental to this concept is a shift in thinking that once a building or structure has been penetrated by the attacking force, the defender must begin to consider options for withdrawing to the next position. The defenders must, when attacked, immediately transition into the attack, thus making the defense more of a meeting engagement rather than a static defense. Further, just as in the swarm tactic concept, other adjacent units must be prepared to assist in the active defense by moving to assist the attacked location.

In preparing the defensive scheme, the defending unit must consider the location of *screening units*, which would then be linked to each other both electronically and physically through lines of communication. In essence, units would maintain overall situation awareness of the zone of operations and through prearranged support agreements and selected routes, move to assist each other in the active defense. Unit commanders will coordinate the assignment and movement of forces, as well as commit the reaction force as required to *on scene commanders* who will provide detailed coordination.

As an enemy force penetrates a structure, the defending unit would notify its higher commander, adjacent, and supporting forces — ideally by updating the common tactical picture. Simultaneously, the unit would go into the attack to repel the enemy force. Vice waiting for the attacking force in defensive positions, the defender should move to the attack while the opponent is attempting to consolidate at his entry point. The defender's advantage in local terrain familiarity and seizure of the initiative by attacking will ideally catch the opponent off balance.

As the on scene commander attacks, adjacent and higher commanders maintain situational awareness through the common tactical picture. By tracking events in the entire sector, all can conduct simultaneous preparation for responding to opportunities or threats ensuing from the on scene commander's attack. Should the local defender be unable to repel the attacker, adjacent and supporting units will be aware of the situation and can move into a counter attack of the position. As these units move to the attack, they should consider the flanks as their primary objectives. Again, as this is not the normal course of urban defense, it may serve to surprise the enemy, thus providing an advantage.

The *active urban defense* requires flexibility in planning and execution. It also requires commanders to be constantly assessing the opposing force to determine patterns of enemy movement and procedures. This is critical for the commander in determining when and where to commit additional forces or the reaction force in the defense.

In addition, the *active urban defense* can also be used to confuse the enemy as to the precise location of defensive lines, critical vulnerabilities, and obscure the defender's true concerns. Practiced properly, the *active urban defense* can contribute to the enemy dissipating his forces and energy at non-critical areas of the battlespace.

In short, the active urban defense is a merging of the tactics of a coordinated, dispersed attack and the defense. It is an application of maneuver warfare based on the commander's intent and not on defending specific terrain. In addition, it parallels the concept of the extended, dispersed battlefield concept in that the active urban defense is extended not by distance, but by conditions of terrain. This defense seeks to maximize the surprise of the attack, while at the same time maximizing the knowledge of and preparation of the defended terrain.

Experimental Tracks

Simultaneous with the exploration of new tactics, techniques and procedures (TTPs) for urban warfighting, the Lab will pursue six tracks aimed at systematically developing specific capabilities to further expand the operating concepts of Hunter Warrior and to extend the abilities of seabased forces in urban littoral operations.

Command, Control, Communications, Computers, and Intelligence (C4I)

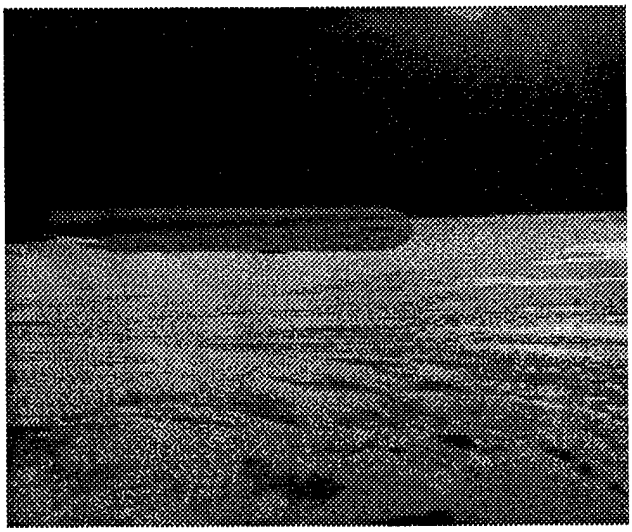
The commander's ability to decisively maneuver within to accurately bring fires to bear, and to provide timely seabased logistical support depends on his ability to gather and process more battlespace information into knowledge than the opposing commander and to use that knowledge effectively.

Battlespace information becomes knowledge when it results in the cognitive recognition of patterns that lead to effective decision making. Knowledge does not require certainty. Instead, it stems from intuitive situational awareness based on interpretation of information.

Effective application of battlespace knowledge requires a flexible, integrated C4I system.

Communications

During *Urban Warrior*, command and control will be conducted employing a three-tiered communications system. Small-units operating at the tactical level from battalion and below will use inexpensive commercial off-the-shelf (COTS) systems — as well as current developmental systems and prototypes — that combine a small personal computer and communications terminal. These systems will employ commercial encryption to transmit to a system of fixed and mobile *repeater/collectors*. The dispersion of these collectors will insure robust communications and will also provide a defense against direction finders. Where practical, direct voice interface between small unit leaders and operational computer data bases using computer-voice recognition will be incorporated.



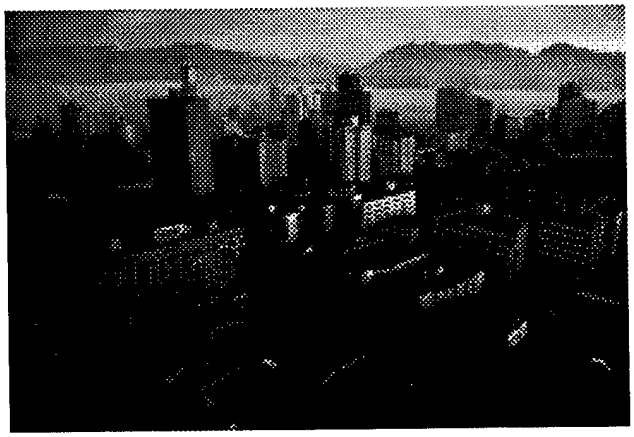
Artificial satellites will provide overhead relay stations connecting communication assets on the battlefield and at sea.

The mid-level tier from major subordinate elements to the MAGTF command element will employ less mobile, more sophisticated capabilities. A key attribute at this level will be the employment of video/visualization products and decision aids that require access to larger communication bandwidths.

A final tier of *purpose-built* assets configured to joint and combined needs will link the MAGTF to the naval task force, joint task force and other external units. Links will be digital, and enabled by employment of easily-launched artificial satellites providing line of sight transmission connecting the entire littoral battlefield, ashore and afloat.

The resulting C4I system that we are developing in *Urban Warrior* must have the following characteristics:

- is interoperable with key Navy and Joint systems.
- provides reliable multi-path information flows in the dense urban canyon as well as on the city's approaches.
- consists of a system of networks that will truly provide a bank of continuously updated circulating tactical and operational information that any unit can directly access.
- supports a common operating picture on the littoral battlefield in near real-time that provides location of friendly units and intelligence on enemy activity.
- supports a collective situational awareness in which one small unit can share its view of the local situation with a nearby unit, and can actually hand-off a target or even hand-off its tactical view seamlessly to another unit to grant local tactical advantage.
- supports a system that ensures all Marines will know where they are and where nearby units are at all times even in the dense urban environment.
- supports selected small units having the ability to employ local airborne sensors in the urban canyons and to share the resulting information in real time with other units.
- blunts the threat of enemy direction finding equipment targeting tactical communications to and from the squad and platoon end user terminals (EUTs) through a combination of systems protection and routing.
- supports two-way voice, data, and graphics flows from the ECOC afloat to all echelons down to squad-size elements ashore.
- provides a system that permits the users to employ all available fires, including aviation in both a centralized and decentralized fashion.
- employs a predictive (vice reactive) system that includes both decision support and advanced visualization for command and control.
- allows the MAGTF to co-opt and exploit existing telecommunications structures around the world. (In short, as cellular digital systems proliferate, prepare to *piggy-back* on them to support expeditionary operations.)



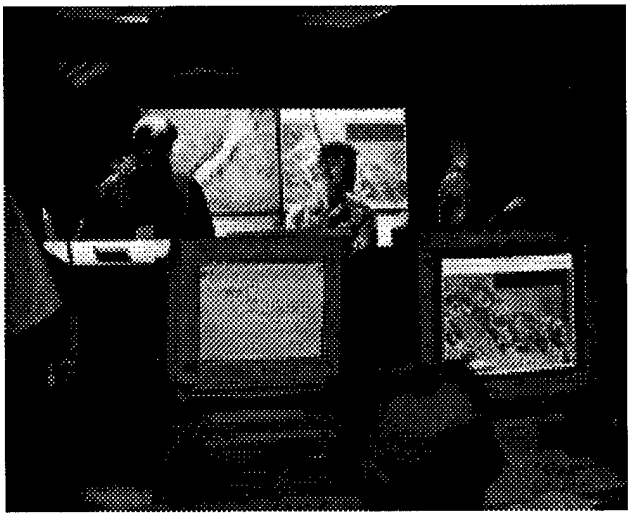
The interference caused by dense urban infrastructures can reduce the efficiency of even the most sophisticated communications systems. Developing a C4I network that can penetrate this environment is a necessity.

Experimental Combat Operations Center (ECOC)

The central MAGTF node for this integrated C4I capability will be the ECOC, usually operated at sea over the horizon, but alternatively moved ashore or located on board an aircraft. The ECOC supports a cellular command element organization designed to integrate rather than segment the battlefield into mediums or functions. However, it is imperative that the C2 environment needed by the MAGTF commander is available at any point of his choosing on the littoral battlefield.

Information management and communications systems hardware and software will operate transparently in the background to support computer assisted planning, execution, and decision making tools. The commander and his staff will use these tools to visualize, to monitor, to process the situation and exercise command and control.

Visualization will include real-time displays of friendly forces status, the latest information



The Experimental Combat Operations Center will take advantage of the visual nature of information in the 21st Century. The ECOC will also be able to integrate information from a variety of sensors, including Marines on the battlefield, and make computer-assisted planning and decision-making a reality.

on enemy force dispositions, capabilities and intentions, and environmental knowledge required to plan future operations, control fires, and maneuver forces (weather, tides, three-dimensional urban map displays).

Cellular Command Element

Among the most promising experimental initiatives in *Hunter Warrior* was a new command element design. Inspired by the Marine Air-Ground Task Force (MAGTF) Staff Training Program's work on the larger Marine Expeditionary Force command element, the Lab designed a command element model reflecting the actual functions that a smaller MAGTF would perform on an integrated and extended battlefield. Under this approach, the historical linear staff model (S-1, S-2, etc.) was reshaped with emphasis on removing stovepipes.

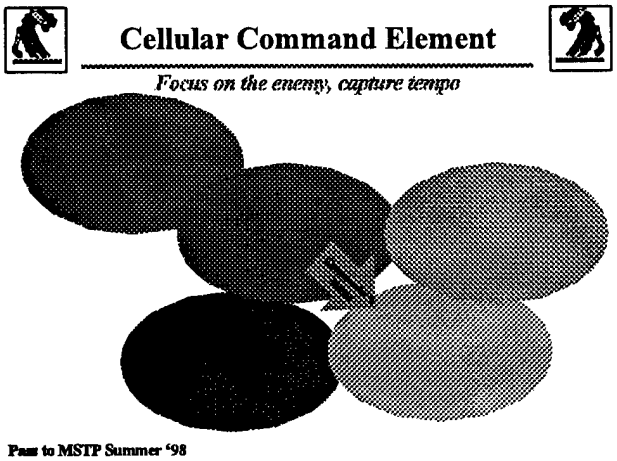
Consisting of cells modeled on battlefield functions, the experimental command element was organized to meet any requirement for mission planning and execution. It was structured to conduct required command and control, at sea or ashore, and was built around the functions of battlespace shaping and engagement coordination cells, supported by a robust combat information organization.

It operates in, and depends upon, a shared information environment to be fully effective. It is designed to exploit the associated real-time capabilities of the ECOC to improve planning, incorporate real-time sensor management, direct and coordinate the maneuver or air and ground units, coordinate fires, allocate bandwidth, and generate a much higher operational tempo and level of situation awareness than previous organizations.

Battlespace Shaping

The planning and future operations functions are performed by the battlespace shaping cell. It benefits from having the same real-time sensor feeds that the current operations/engagement coordination cell uses to fight the battle. Among the most significant functions of the battlefield shaping cells are:

- coordinating with higher headquarters on future operations.
- developing future information requirements
- coordinating concurrent planning of subordinate command elements.
- developing specific rules of engagement
- developing decision matrices and alternate branches and sequels.



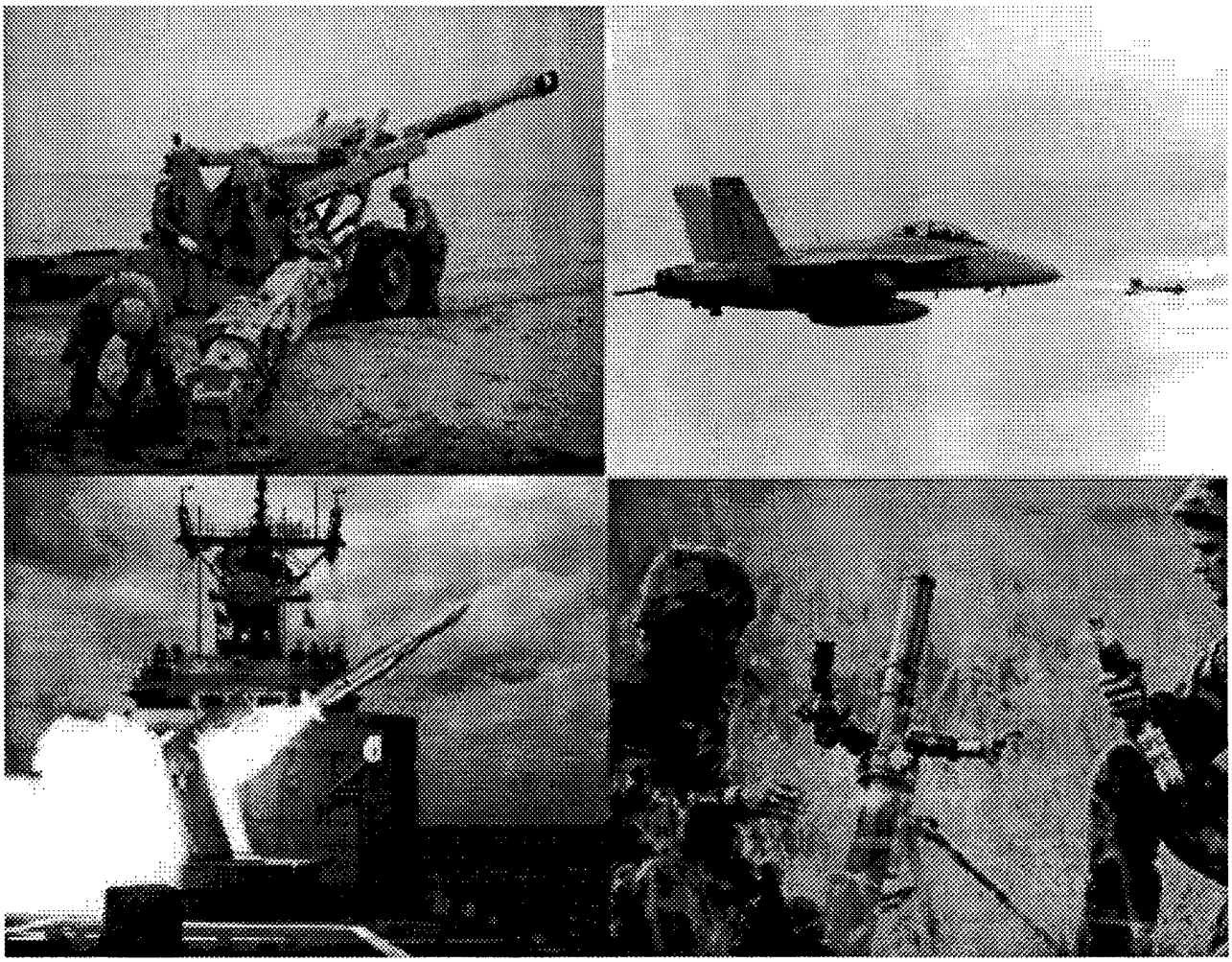
The cellular command element differs from the traditional, layered approach. Its organization was inspired by the Marine Air-Ground Task Force Staff Training Program's work on the larger Marine Expeditionary Force command element and focuses on the functions a MAGTF would perform on the integrated, extended battlefield.

A key function of the battlespace shaping cell is the coordination of reach-back staff functions for special skills and expanded products such as specific intelligence production or future target analysis. Developing a robust reach-back capability provides both augmentation and expansion of the forward MAGTF's cellular command element's effectiveness, particularly for afloat staffs where space and staff are a premium. Developing a network and establishing relationships with potential sources of reach-back expertise in anticipation of future requirements is a principal responsibility of the cell.

Engagement Coordination

Current operations are conducted within the cellular command element using the concept of engagement coordination. Engagements are executed not only through the use of coordinating indirect fires but also the systematic employment of information in maneuvering forces, sensors and the necessary bandwidth to support the command and control of the other three.

Precise and timely tracking of all friendly forces and known noncombatant locations throughout the battlespace is essential to effective engagement coordination. The boundaries and fire support coordination measures of previous systems will be replaced with buffer circles around friendly forces and noncombatants and these circles will move as those groups move. This will permit greater flexibility of target attack and will permit opportunistic target engagement — to specifically include attack by tactical aviation.



Engagement coordination is more than indirect fire support and is tied to the ability to track friendly, enemy and non-combatatant forces on the urban battlefield. Precision tracking of these forces may make linear fire support coordination measures obsolete. Buffer circles that move when friendly and non-combatant forces move will take their place and permit greater flexibility to attack targets.

To provide the needed responsiveness, the overall concept of fires coordination must take a new direction. Where past operations have had the focus of relatively static ground-based fires, future operations will require the preponderance of fires to come from sea-based platforms. Where fire support coordination previously concentrated on focusing fires on a main effort of ground forces, the new objective is providing efficient, immediate precision fires on critical targets over broad areas — often at long distances. This new paradigm is called engagement *coordination* and bridges the emphasis on fires to support maneuver to the use of tailored effects against enemy centers of gravity. Accordingly, engagement coordination centers afloat and ashore will have to be able to detect and prioritize targets, then allocate and direct fires of all types at the time and place required.

This *detect, decide, deliver* cycle is similar to past processes. However, it requires greater capacity to combine the intelligence/target acquisition resources to form a more comprehensive view of the enemy. At the same time, the inherent ability to correlate, coordinate, and de-conflict the combined fires of a naval-centered Joint Task Force must be retained. The engagement coordination systems of ECOCs — both ashore and afloat — must be fully compatible with all US military systems and must provide a clear and immediate picture of fires requirements as they are needed.

In addition to the deliberate targeting sequence, there must be a process by which Marines ashore can receive responsive fires. This means the MAGTF commander must have the ability to coordinate and direct both preplanned fires as well as fast-reaction direct attack fires through the same coordination system. The underlying principle is a system for the fastest and most appropriate fires on target, 24 hours a day.

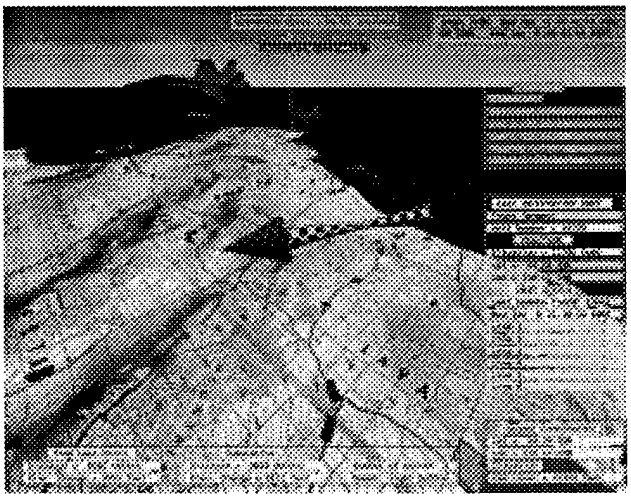
Another critical function of the ECOC, particularly in the constrained/urban environment, is airspace deconfliction. In the confined airspace above cities, aircraft of all types will be operating at the same time that artillery, mortar and rocket projectiles are being shot through the air space. To make this possible, radar coupled with computer management systems will be needed to predict each projectile and air vehicle flight path within the airspace above the city. The system will plan ingress and egress routes for aircraft and optimal firing trajectories and timing to allow full engagement of the enemy without interfering with flight operations.

In short, the ECOC will maintain a *single integrated air, ground, and trajectory common operational picture.*

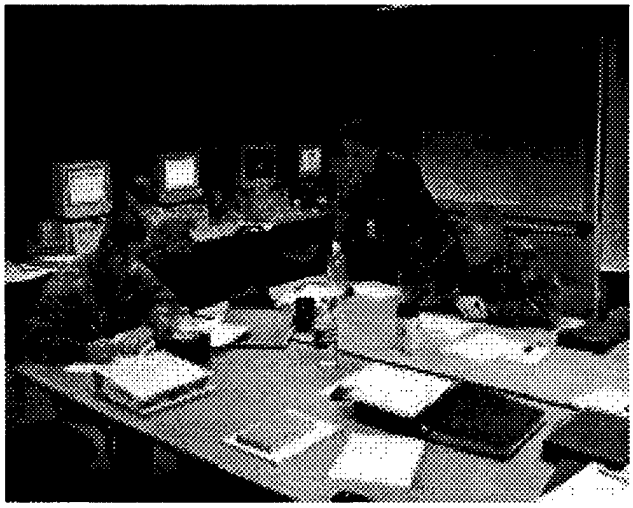
Intelligence

The intelligence function is especially critical to urban operations and supports two primary functions: battlefield visualization and situational awareness.

Battlefield visualization is the dynamic three-dimensional display and analysis of terrain, features, forces (enemy, friendly, and uncommitted) and events in sufficient detail to support tactical operations in urban terrain. Data from national, theater, organic and non-organic sensors, human intelligence and operational forces is fused into a common graphical picture. This picture is constantly refreshed with new data gathered through automated collection management. The goal of visualization is to produce the best available operating picture to support



The goal of three-dimensional displays — updated continuously by information from operating forces, national, theater and organic sensors — is to provide commanders with the best available operating picture to support decision making by the commander and the staff.



The "red" cell within the ECOC focuses on operational risk. This group advises the commander of possible enemy counter moves.

decision making by the commander and the staff. That picture will be continuously updated, to include special alerts when significant changes take place.

Situation awareness is the commander — and his staff's — understanding of the battlefield context in sufficient detail to support effective decision making. Context in this usage refers to people, environment, history, tactics employed by opposing forces, and a wide range of factors (such as culture, politics, religion and economics) Battlefield visualization supports situational awareness by depicting information — to include intelligence — in such a way that it supports rapid assimilation into knowledge and understanding such that critical decisions can be effectively made.

Within the cellular command element of the ECOC, intelligence is melded with communication and information management into the *combat information* function. The communications and computer systems used to tie the other information/sensor systems together will include a digital *shared net,* to rapidly move both voice and data automatically to those who routinely use it and to feed data into battlefield visualization systems. Data stored on the shared network is available on call to all those with a need for access to it.

Within the cellular command element of the ECOC, responsibility for maintaining combat information concerning both friendly forces and non-combatants as well as enemy forces as an inherent part of the operational environment is assigned to the combat information section. In addition to distributing and archiving information, this section is responsible for assuring the timeliness and reliability of information within the system.

The red cell is an integral part of the cellular command element charged with providing continuous interpretations of enemy capabilities, intent and potential impact on friendly intent. The concept of the red cell is that it is made up of combat arms officers — assisted by intelligence specialist/officers — intended to advise the commander to the potential courses of action and counter moves of the opposing forces with an emphasis on assessing *operational risk.*

Sensor Employment and Information Operations

Tactical sensors are a particularly important aspect of the information structure that must be specially tailored for the urban environment. Sensors developed for the extended battlefield will remain useful for monitoring approaches to urban areas. Sensors designed for wide-area surveillance, however, may have limited applicability within cities. Instead, sensors are needed that can observe inside buildings, into the sub-

Sensors constructed solely for the urban environment, such as the Hummingbird UAV, offer better means to collect information than ever before. In addition, they can conduct force protection missions by keeping an "eye" on cleared areas and potential trouble spots.

surface layer, within the urban canyons and into other critical areas denied to overhead sensors to detect the presence of explosives, chemical/ biological weapons, and personnel. The urban sensor array must include both broad area coverage and detailed surveillance, and must be capable of being emplaced in or moving through surface, sub-surface and above-surface areas for appropriate positioning. The resulting sensor data must be interpreted and then introduced into the shared net so that it is available to all who need it — task force commander, MAGTF commander, aircraft commander, or small unit leader.

One of the more significant uses for sensors in the urban environment is in supporting force protection initiatives by monitoring cleared areas and providing wide area surveillance. Wherever possible, sensors must be used in lieu of security forces in order to free the maximum number of Marines for more complex offensive and defensive roles than surveillance.

In the urban environment, sensors, improved information sharing, and information integration are not enough. Operations in the urban environment inherently require greater human intelligence (HUMINT) capabilities. Expeditionary forces cannot carry an infinite number of sensors. Even if they could, sensors cannot determine an individual's or group's intent.

In urban areas, the opposing forces may either be indigenous or look and act like the local population. Through HUMINT, it is possible to gain knowledge concerning where opposing forces operate, what characteristics distinguish their operations, and improve understanding of how the presence or activities of opposing forces are likely to affect the MAGTF's mission.

Intensive, sustained, highly focused intelligence operations will be executed throughout. During planning and advance force operations, tailored, up-to-date data bases on conditions in the urban objective area will be rapidly identified and accessed by operating forces and supporting establishment agencies. The resulting specialized data on areas/facilities/forces will be used by the MAGTF and naval task force to shape operations. Information operations will also be an important part of advance force operations and will support the battle space dominance and power projection functions essential to conducting operational maneuver from the sea.

Urban Fires and Target Location

The *requirement* for fires on the dense urban littoral is no different than on other battlefields, but the *nature* of those fires will be dramatically different. Fires can no longer be considered a separate or supporting function. The full range of direct, indirect, lethal, and non-lethal *fires* must be integrated into the engagement coordination process. Controlling collateral damage and non-combatant casualties starts with improved target discrimination so that we shoot the right targets. It also it includes target location so that we hit what we shoot at. Subsequent decisions must address type of weapon (lethal or non-lethal) to achieve the desired effect on target while controlling collateral effects. Choosing the type of engagement (direct or indirect) must be based on clear knowledge of available fires capabilities and their locations, the responsiveness needed to engage often-fleeting targets, and the required degree of precision. The selection of specific forces or

Due to the large numbers of non-combatants on urban battlefields, precise direct and indirect weapons systems must be developed. In addition, munitions must be devoloped for indirect fires that have scaleable effects, capable of taking out precise locations within buildings and other structures.

launch platforms (air, ground, sea) must be based on the ability to effectively engage the target balanced by risk to the engaging forces/platforms.

Fire support has two missions: **precise fires** to eliminate critical enemy elements and **suppressive fires** to block or prevent the enemy's attacking power. Both types of fires can be lethal or non-lethal as required. The critical difference in the extended and constrained battlefields is that fires are much more time-critical and require greater levels of accuracy than have previously been achieved.

Immediately responsive fires are the most important consideration for Marine forces operating on a dispersed battlefield. The combat effectiveness and survival of smaller maneuver forces may well depend on highly-responsive fire support. To achieve this capability, fire support systems must be capable of striking targets quickly and many many require allocation to maneuver units.

Fires in support of widely dispersed units cannot always wait for a set of circumstances and preset priorities at a command center. Marine units on the dispersed battlefield are maneuver elements that require fire support to complete their missions. The most capable and immediately responsive weapons are air-delivered munitions, loitering air weapons, or potentially, unattended ground systems such as the 120mm Dragon Fire mortar.

The constrained battlefield has some unique requirements which differ from those of the extended battlefield: fires must have suitable trajectories (trajectories that can clear the tops of buildings/obstacles to hit targets within the urban canyons), have first round accuracy, and scaleable weapons effects to cause the desired result on the target with minimal collateral casualties and damage. The accuracy requirements are critical. Nearly all missions will be danger close missions and the targeting must be in three dimensions.

Surface fusing of projectiles may not be useful in many cases, because targets may be inside structures, revetments, protected underground facilities, or in streets inside the urban canyons. Delay fusing will be required to effectively penetrate structures. In addition to the need for precision targeting and penetration control, indirect weapons must account for widely varying elevations on the urban battlefield.

Within the confines of the city, particularly where noncombatants are present, area weapons have a limited utility in order to reduce collateral damage. Currently, the most effective weapons are precision air-delivered munitions, air loitering weapons, and GPS or laser guided artillery and mortar projectiles.

Some emerging missile systems, such as EFOG-M, could allow MAGTF units to visually acquire their targets and use fiber optic cable to allow the operator to guide the weapon directly to the target. Current technological gaps which must be addressed are precision target location within urban terrain, high explosive, scaleable and non-lethal projectiles for air, artillery and NSFS weapons, and *urban fusing* for all projectiles.

Target Location

The key to effective fires on all battlefields — whether extended or constrained — is accurate and dependable target location. Whether a man-portable system, or a system mounted in an aircraft or a vehicle, a precision targeting system must be able to locate the target in three dimensions and transmit that position quickly over reliable communications means.

The range to target capabilities vary, with 10,000 meters as a desired daylight range for extended battlefield systems. A somewhat shorter range system may suffice in urban environments. Target acquisition at night and through battlefield obscuration remains essential.

In an urban environment, laser designators may be difficult to use in some circumstances with the reflectivity of window glass and other surfaces. In any system, target location will need to be sent rapidly through the ECOC or directly to the supporting weapons system.

Direct Fires

For the constrained battlefield, direct fire weapons that can accurately engage targets within structures remains a critical requirement. Ideally, such a system would have a soft-backblast launching system that presents a minimum signature and is safe for use in restricted areas. Other characteristics of direct fire systems are almost immediate arming mechanisms, mouse hole entrance capabilities, little or no signature/backblast, and light weight.

Snipers — both ground and aerial — can play a key role in both counter-sniper and force protection roles. In addition, if located in overwatch positions, snipers can provide protective fires for air assault operations and urban canyon crossing operations. One of the key objectives within *Urban Warrior* is the exploration of the use of anti-sniper technologies to include automatic counter fire systems and remote controlled ground vehicles with robust sensor systems.

A Marine using an early prototype of the Small-Eyes targeting binoculars. To direct fires accurately in the urban battlefield, a highly-reliable precision target location device — preferably lightweight and easy-to-carry — is a must.

Missile systems, such as the Multi-Purpose Infantry Munition/Short-Range Assault Weapon, have the capability for firing from within enclosures and are fire and forget weapons, but are expensive. SMAW is being refined as a fire-from-enclosure weapon and may further address urban combat capability shortfalls. The 120mm LAV mortar variant is another potential direct fire support system for urban combat that can augment tank main guns.

Marines need weapons capable of being fired from inside buildings. Current efforts to refine the SMAW may address this need, as may other fire-from-enclosure weapon systems.

Urban direct fire support effectiveness would be improved with warheads developed for enhanced concrete breaching, particularly steel-reinforced concrete. Current anti-armor shaped charge warheads are not well suited for urban fortification/breaching applications. Air delivered systems, such as attack helicopters — firing TOW, Hellfire missiles, or cannon — have merit against certain targets, but expose the helicopter to close range enemy fires when employed in cities.

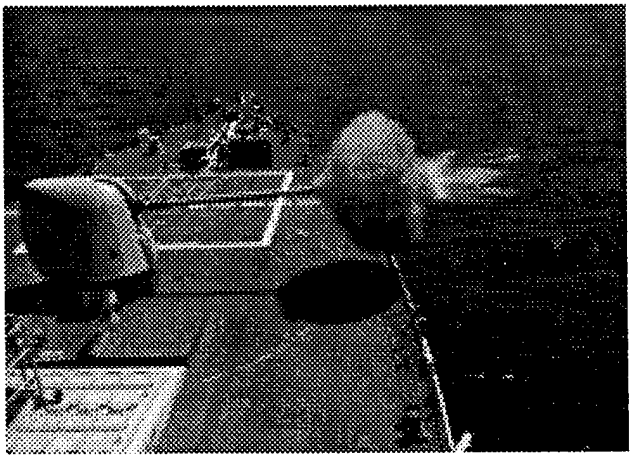
Indirect Fires

The Naval Task Force/MAGTF will have an extensive range of fire support at its disposal: air delivered fires, long range missiles, gun-launched sea-based fires and ground-based fires. Current fuse and munition combinations, however, may inhibit their effective employment in many urban situations. NSFS systems, like the Vertical Gun System (VGAS) the Extended Range Guided Munition (ERGM) and Naval Tactical Missile System (NTACMS) have ranges of 100 kilometers

or more. These and other emerging naval munitions are capable of very accurate fire in support of deliberate attack against immobile targets. A drawback is time-of-flight. At their maximum ranges, times of flight are eight minutes or more.

Air delivered fires from attack aircraft, loitering weapons, or armed UAVs have shorter response times and can provide immediate support if those weapons are available and on station. Close air support will be conducted on both the extended and constrained battlefields. In both cases, employment will largely be opportune, requiring a high degree of flexibility in response to enhanced targeting operations. Rules of Engagement will play a central role. In the urban environment, weapons delivery will involve a high degree of precision to limit non-combatant losses and will often involve target designation by ground units operating within the urban infrastructure.

While the current array of fire support is impressive, there are some important gaps in capabilities. With the exception of a few specialized loitering munitions, there are no unmanned air weapons available. Standoff air-delivered weapons, such as JSOW and JASSM mitigate the danger to aircrews to some extent, but availability is limited to the time an aircraft can remain dedicated to that mission and remain on station. In addition, current artillery or mortars are limited to securable firing sites, with lines of support sufficient to provide security, ammunition movement and support for the crews.



Improvements in naval munitions will offer greater flexibility to MAGTF commanders in the future. Several developing munitions, such as VGAS and ERGM, have ranges greater than 100 kilometers.

The Dragon Fire autonomous firing system (previously called the *Box Mortar)*, offers a complementary alternative to conventional mortar and artillery systems. It provides a crewless, self-loading, and remotely controlled indirect weapons system that can provide immediately responsive fire support to dispersed infantry units and can be transported in an MV-22. Its long range (up to 14km using its current production RAP round), 360 degree target engagement capability and 32 round magazine provides significant new options on both the extended and constrained battlefields. When linked to an effective sensor system, it also has applications as an alternative to anti-personnel minefields used for force protection or wide area denial.

Suppressive fires remains an important capability gap — particularly in isolating the battlefield. Where this requirement was adequately covered by artillery and mortars in past conflicts, the support and security structure for conventional artillery is a difficult task on the extended battlefield. Some possibilities to supplant conventional artillery for this mission are unattended artillery, loitering air platforms, or high-speed missile systems.

Non-Lethal Technologies

Non-lethal technologies provide additional options to the commander and are not intended to replace the use of deadly force. In urban operations, non-lethal technologies can be expected to have a wide range of potential uses. Indeed, non-lethals are limited only by the imagination and tactical experience of small unit decision makers.

The vast majority of non-lethal technologies currently available to Marine operating forces are derived from civilian law enforcement agencies that have used them for riot control and crowd dispersal situations. Others, such a *stun/flash grenades* have been employed by special operations and civilian SWAT organizations during hostage situations. Other technologies — such as sticky foams, slippery foams and quick

Non-lethal weapons offer Marines and their commanders numerous tactical options. Non-lethals may be used for a variety of missions, ranging from crowd control to closing enemy avenues of approach.

drying substances that can be used to seal or block doorways, windows and pipes — can be used to seal avenues of approach within buildings and to subterranean avenues of approach.

Aviation

All six functions of Marine aviation will contribute on the urban littoral battlefield. However, the nature of the urban battlefield, and the need to integrate aviation platforms into the engagement coordination process will shape how aviation operations are executed.

The urban environment provides several challenges for aviation support to specifically include assault support and offensive air support.

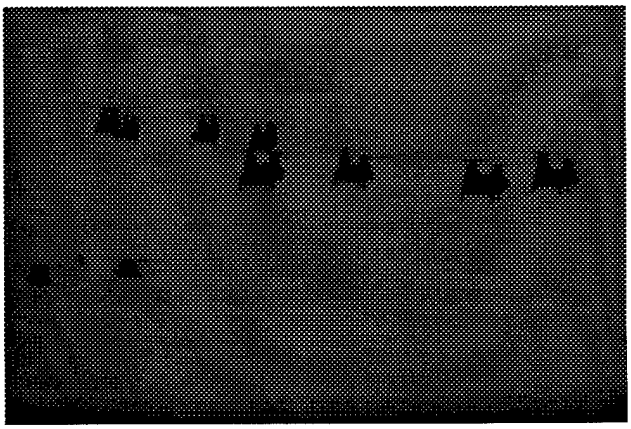
Assault Support

The nature of the urban environment and the potential for enemy air defense capabilities will demand the development of appropriate aviation tactics, techniques, and procedures. The potential difficulties for conducting air assault in the urban environment dwarf those of the hills, forests, jungles, and deserts of the rural environment.

The variety and complexity of the urban environment presents special challenges to assault support. There are thermal drafts, buildings and structures of various sizes, a constantly changing pattern of light during periods of darkness and, most seriously, an almost unlimited variety of locations in which to conceal anti-air tracking and firing systems. Numerous obstacles to approach and takeoff preclude flight operations from what otherwise might appear to be an adequate landing zone.

Development of concepts to increase the survivability of air assaults in the urban environment is another critical aviation issue. Hand-held air defense systems, integrated radar systems, thermal sites and other sophisticated anti-air assets are available to any potential foe with the means or methods to acquire them. The requirement to conduct simultaneous operations on both the extended and constrained battlefields with limited assets places a premium on survivability, deception and economy of force measures. Accordingly, assault lift will normally be reserved for penetration and lift of maneuver elements.

Decoys will be used extensively. For example, decoys may be used to simulate MV-22 sections during penetration operations and UAVs equipped with appropriate sensors will record enemy acquisition radar locations for subsequent destruction, through either the employment of jamming, decoys, or by homing in on and engaging tracking beams.



The ability of enemies, armed with shoulder-fired surface-to-air missiles, to shoot and hide in the urban environment is a major challenge to air assaults. Developing methods to increase the survivability of air assaults is a cornerstone of Urban Warrior aviation efforts.

Despite the difficulties, tactics, techniques, and procedures — and the necessary technology to conduct air assault and resupply operations — must be developed. One ground support experimental concept for aviation is an urban Suppression of Enemy Air Defense (SEAD) concept, where a relatively benign air corridor is established for a designated time over a designated space to facilitate the passage of assault and supporting aircraft. Conceivably, this corridor could be established primarily with counter-sniper sensor systems and immediate response weapons to retaliate immediately to threats.

Offensive Air Support

The three mission areas of Offensive Air Support (OAS) that are most relevant to the urban battle are:

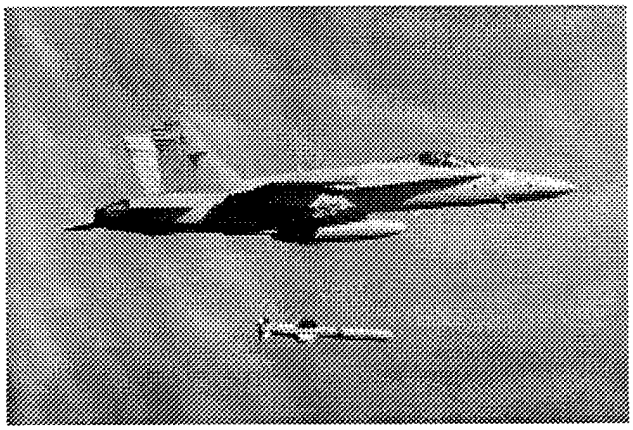
- Strike Coordination and Reconnaissance (SCAR)
- Armed Reconnaissance (AR)
- Close Air Support (CAS).

The urban environment poses unique difficulties in the conduct of each of these mission areas due to increased difficulties in maintaining situational awareness (SA) of friendly force locations and air defense threats. Other difficulties include identifying targets within the urban clutter, establishing clear routes for effective weapons employment, avoiding collateral damage and minimizing the adverse effects of buildings masking on communications line of sight with observers on the ground. At the same time, opportunistic offensive air support is particularly well suited for an air interdiction and urban isolation role.

During *Urban Warrior*, the focus will be on three issues: (1) exploring techniques for improving air crew SA, (2) developing improved techniques for target designation and marking by ground forces, and (3) refinement of CAS TTPs for urban employment. In most cases, experimentation will be conducted either by Marine Air Weapons and Tactics Squadron One (MAWTS-1) at MCAS Yuma, Arizona, or the operating forces. However, the overall intent is to develop a program that will have applicability across naval aviation and result in the ability for carrier aviation to conduct OAS with an understanding of the MAGTF/Landing Force commander's *intent* and scheme of maneuver. Accordingly, wherever possible OAS experimentation will be conducted in conjunction with Fleet Battle Experiments or Naval Strike Aviation Weapons Center (NSAWC) Fallon, Nevada.

Airborne imagery provides a unique visual and operational perspective of the battlespace for both the commander on the ground and the aviator in the air and can asist in maintaining SA and in rapid identification of targets. Near real-time transmission of both conventional and infrared photography into the cockpit through the *Forward Hunter* and *Photo-telisis* systems have demonstrated considerable promise and will be applied to urban target identification during *Urban Warrior*. The ability to receive and transmit photography and maintain SA of the situation on the ground may enable aircraft to provide pathfinding services to ground forces navigating in the urban sprawl while employing such technologies as *green beam* marking and other navigational aids to support ground maneuver.

The no-drop bomb scoring system and aircraft on-board recording systems will be used to evaluate the effectiveness of urban precision engagement. In addition, the feasibility of a



CAS tactics, techniques and procedures must be refined for urban areas. The Lab is working closely with the Marine Air Weapons and Tactics Squadron One (MAWTS-1) at Yuma, Arizona in developing experimental CAS tactics.

helicopter mounted, stabilized sniper rifle will be assessed. Ordnance that has cockpit selectable effect's — to include no explosive effect at all — would be well suited for use in attacking the wide variety of possible urban targets. The type of weapons guidance also needs to be examined. Traditional *smart* weapons may not be the most effective or the most useful in built up areas due to guidance system requirements.

Urban Infrastructure

The ability to precisely navigate into a landing zone in all weather and all light conditions — especially for medevacs and resupply — is crucial to maintaining a high tempo of operations. Whatever navigation technology is used must be passive and cannot have an emission signature that an opponent could exploit. Such systems as the Transportable Tactical Landing System (TTLS) will be experimented with to determine if such a portable precision terminal guidance system is viable using current technology and how such a capability can add to the expeditionary capabilities of the MAGTF.

Aviation will initially be available only from the seabase. Shorebased expeditionary fields and forward arming and refueling points (FARPs), however, may be required to support desired operations tempo. The role of engineer and support units will reflect changes in aviation employment patterns in the vicinity of urban operating areas. For example, there may be a need for a capability to rapidly establish helicopter operating sites atop high-rise urban structures using new technologies such as foam support.

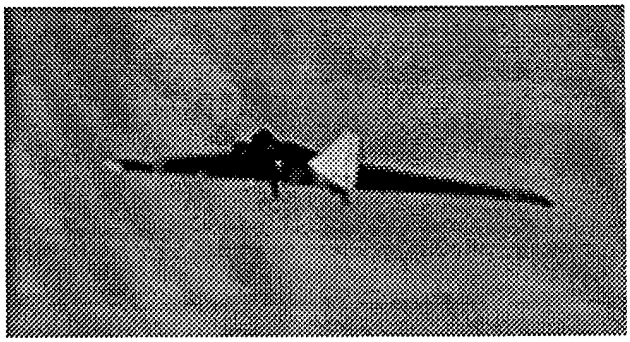
In addition, there remains a need to rapidly introduce fly-in packages of fixed-wing aircraft. Shore-basing adds flexibility for tactical aviation in conducting continuous operations independent of deck cycles. A fly-in package could consist of a mix of C-130, F/A-18, EA-6B and AV-8B aircraft. It would require a slice of the MACCS designed to aid the MAGTF commander in the coordination and control of aviation assets as an integral part of the MAGTF ACE and in coordination with sea-based naval aviation.

FARPS to service fixed wing aircraft would be small, highly-portable and rapidly disassembled/ reassembled. The intent is to be able to transform civilian airfields, temporary air-fields employing expeditionary matting or a length of local highway into a usable airfield for short periods of time.

Tactical UAV

The ability of a responsive tactical UAV to transform the extended, open battlefield was demonstrated during *Hunter Warrior* by the use of the Dragon Drone tactical UAV using a *pan-tilt, zoom* camera and presenting an IR signature too small to be tracked by the Stinger missile system, it was able to provide the MAGTF commander with a video of the battlefield from over 150 miles away via satellite relay. Additional capabilities such as FLIR cameras for night operations, remote delivery of sensors and non-lethals, and radio relays are additional capabilities the Lab may incorporate in future models of the evolving Dragon Drone.

On the extended battlefield, targets will frequently be detected using concepts such as *rolling UAV reconnaissance zones* involving Dragon Drones and other sensor assets employed on key avenues of approach to the urban objective area. In addition, UAVs can play an increasingly important role in force protection during operations in urban environments.



The Dragon Drone is a tactical, unmanned aerial vehicle capable of being "handed" to squads on the ground. Armed with a pan-tilt, zoom camera and presenting an infrared signature too small to be tracked by anti-air systems, the Dragon Drone has proven be a key sensor on the extended battlefield and offers several capabilities, including force protection, for the urban environment.

During *Urban Warrior*, the Dragon Drone experience will be built-on to explore the utility of rotary (and by inference tilt-rotar) UAVs in the urban environment. Specifically, we will explore the relative merits of having a platform capable of hovering or temporarily landing on key vantage points and the tactical implications of UAVs used to conduct day and night surveillance and reconnaissance as well as target acquisition on the urban battlefield. Additional uses such as the remote delivery of non-lethal technologies, a limited capability to detect the presence of aerosol chemical-biological agents, radio relays, and target designation — to include the detection of the presence of individuals through the walls of buildings — will be explored.

Urban Warfighting

Urban warfighting presents a number of challenges. One of the more significant is force protection. Rapidly erectable shelters, protective sensor systems, potential employment of robotic machines, reconnaissance inside buildings and the use of obscurants to shield maneuver through danger areas require exploration.

Another significant challenge is that of ensured mobility in the constrained urban battlefield. Debris, panicked non-combatants, collapsed structures and interdiction by fire from concealed positions can prevent effective movement on the floor of the *urban canyon.* Accordingly, within the dense urban environment, the primary means of mobility are foot and, where tactical conditions permit, heliborne movement. In addition, small units will employ new suspension and projection technologies to rapidly move across the streets composing the *urban canyons* well above the *floor* but below the *rims.* Using such horizontal movement between and through buildings, small units will move to bypass strong points and gain tactical advantage. Complementing movement above the floors is subterranean mobility in subways and sewers. While heliborne mobility will be a principle means for introduction of forces, a variety of factors — to include the presence of a manportable air defense missile threat — will determine how large a role it will play.

As the Lab moves towards developing new operational concepts, tactics and techniques for the urban environment, it is apparent that additional military skills will be required to conduct certain types of operations. Just as some infantry battalions have equipment and Marines who are trained as lead climbers for mountain operations, there may be a requirement for specially trained Marines and equipment for urban operations.

Urban Rope Suspension

Several specific requirements for specialized equipment and skills in the urban environment have become apparent. First is the capability to traverse the urban canyon through the use of rope suspension. Second, is the capability to traverse the urban environment via subterranean modes, and third, is the requirement to traverse the urban environment above the surface without the use of helicopters/aircraft.

Traversing the urban environment at the appropriate time and place is a vital requirement. This includes the capability to maneuver to and between buildings/structures at any point. Units must not be restricted to entering buildings from the ground level or from the top. The capability must be developed to traverse from one structure to another at any elevation. Capabilities must be acquired, and

Debris, non-combatants, collapsed structures and the three-dimensional aspects of the urban canyon make cities the most dangerous battlefields in warfare.

techniques developed to facilitate the movement of infantry and reconnaissance units (this includes supporting attachments such as engineers and FOs) from building to building above the ground level. In short, if a commander wishes to traverse from the 12th floor of one building to the 15th floor of another, he should have the capability to do so.

In addition to the capability to traverse from structure to structure, combat units must have the capability to maneuver throughout multi-story structures without the use of stairs or elevators. This capability must include both internal and external capabilities. This must also include the ability to move from top down and bottom up.

Capabilities should not be limited to ropes only. For example, the capability may exist or be developed that would permit movement on elevator cables without the use of ropes. For purposes of simplicity and conveyance of thought, the title Urban Rope Suspension is used.

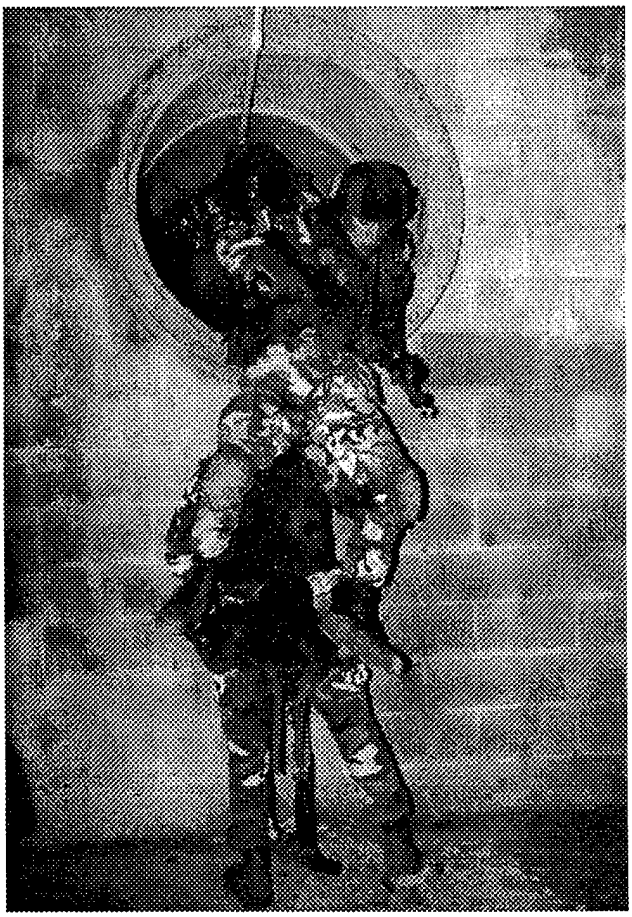
Capabilities and techniques must be as simple as possible in order to facilitate their use by combat units without the requirement for extensive training. If this is not feasible, the alternative is to develop capabilities and techniques that are taught to select individuals within a unit, who are then responsible for creating the suspension systems for the other members of their command. Under this concept, a few individuals would receive extensive training in the skill, while the average member of the unit will receive only the training necessary for him to effectively and skillfully utilize the established system. The preferred option is to develop capabilities that are simple and effective enough to be employed by any Marine with limited training.

Subterranean Movement

Just as the requirement exists to traverse the urban environment on or above the ground, the capability to maneuver below the surface must be developed. This must include the capability to navigate and communicate. Subterranean movement includes the ability to traverse all types of natural and man-made subterranean features (caves, caverns, sewers, power conduits and subways).

As part of this capability all types of underground systems and access points must be found. The capability to navigate through these systems, communicate and report locations are basic requirements. Capabilities to operate and survive in the various types of underground systems must be developed. Some examples include: effective transportation means such as sleds or trolleys, specific survivability enhancements such as air quality sensors, non-fragmentary or ricocheting weapons systems designed for close quarters, and the use of robotics or mechanical *snakes* to provide advance reconnaissance through potentially dangerous underground avenues.

Sewer and underground utility systems offer one of the most clandestine avenues for penetrating the urban environment. These systems, however, may be hazardous or impenetrable without specialized equipment and training. For example, human waste material and contaminated



Underground mobility, usually through storm and sanitation sewers, is an unique avenue of approach in the urban environment.

water may be so deadly to an exposed human as to render them ineffective. Similarly, firing of conventional weapons in an environment with a high methane content may pose unacceptable risk.

Transport systems that can be utilized within sewers and underground passages to limit direct exposure of operating units to contaminants and to speed maneuver may also be required. Finally, the development of specialized operational and tactical skills for the subterranean environment must be developed. As with rope suspension, these skills may be a sub-specialty taught to a few members of each unit vice all personnel. As was discovered in the clearing of tunnels during the Vietnam War, many personnel are unsuited for operations below ground. Specialized equipment for operations within the subterranean environment must also be developed and procured for urban operating units.

Just as special skills, techniques, and equipment are developed for operations within sewer systems, similar examination must be made of other types of underground passages, such as subway systems. As an example, the capability to utilize the existing transport system, or to leverage portions of it must be developed. This would include the capability to operate the existing system, and/or the development and employment of a self-powered conveyance that can operate on the existing track system and transport sensors, personnel and supplies.

Above Surface Individual/Team Flight [ASITF]

This capability will provide the commander the ability to conduct potential clandestine penetration of the urban environment through the air. Small units or teams can rapidly penetrate the urban environment to conduct a variety of missions. Teams can seize selected objectives, isolate prospective HLZs, conduct screening missions and perform reconnaissance.

Currently several options exist for ASITF. These include paragliders, parachutes, and powered parafoils. All of these options should be explored within the following guidelines. The system should be easy to operate and to learn. It should give the user maximum flexibility and options for landing and subsequent takeoff. It should possess maneuver capability in order to avoid obstacles, defenses, fires and other threats.

As with the two previously discussed capabilities — rope suspension and subterranean movement — the chosen capability should be as simple as possible in order to be used by the average infantryman or reconnaissance scout. If this is impossible, or impractical, then select personnel should be trained in the necessary skills to operate the equipment and conduct specialized missions.

Taken as a whole, the above capabilities offer the commander additional options for maneuver in the urban environment. They begin to open the door for utilizing the tenets of maneuver warfare in the urban battle. They can potentially offer the commander the flexibility to choose options for maneuver beyond those now currently available, thus striking at the enemies vulnerabilities, flanking his strengths, and striking where he is least prepared. They offer the capability to move in the urban environment with greater force protection, offered by surprise and speed, than is now available. They do, however, require special skills, training and equipment that is not currently available.

Seabased Sustainment (Combat Service Support)

Future expeditionary sustainment will be based on the maxim that friendly centers of gravity/vulnerabilities will be sheltered while opposing centers are exposed. The support of non-contiguous maneuver elements on the extended battlefield and widely-separated urban engagement areas in the constrained battlefield will require a minimal footprint ashore and maximum freedom of maneuver. Accordingly, sustainment will rely on seabasing, supplemented by opportune use of indigenous resources. Developing our ability to effectively *forage* for power, water, and fuel may provide a

significant reduction in the logistics requirement on the seabases. (Examples include adapters to permit use of indigenous power when operating at fixed sites within urban structures rather than using military unique batteries, man-portable water purification for drinking water, and fuel testing devices.)

Information technology is likely to offer the greatest leverage in creating the logistics system of the future. The full benefit, however, will be gained only by applying it in the context of logistic enterprise processes that draw together, in an integrated and deliberate design, all relevant activities to accomplish specific goals within a common vision. The vision of Marine Combat Service Support and Marine Corps logistics of the future will, and must be, ***to replace our footprint and inventory (mass) with speed and information (precision)***. Only in this way can logistics be changed.

Logistics in its basic form is simply providing supplies and services to a customer. The challenge is to reduce or eliminate the time from the customer request to when the supplies or services are received. The goal is to accomplish this without having huge inventories on hand. Beyond this *business* perspective of response time and distribution, Combat Service Support (CSS) must be fully capable of providing services and support in the fast-changing, mobile warfare environment envisioned for the future.

Central to future Combat Service Support must be a fully integrated, ***anticipatory*** CSS Command and Control system. Logistics operations in the fast-changing, mobile warfare environment will have to be thoroughly but rapidly planned, tightly controlled, and precise in delivering supplies and services. Data, communications and automated decision support aids will be the lifeline of logistics operations.

The most timely way for a logistician to provide supplies and services is to not have to provide them at all. If a unit is on a five day operation and is carrying five days of rations, then there is, theoretically, no resupply requirement. Certainly, there is a down-side. The individual Marine has to carry the rations. Future technology, however, will provide the opportunity to reduce or eliminate this burden, allowing the logistician to ***embed the supplies*** and services in the machines, weapons or personnel. Improvements in operating methods, precision ordnance, and material reliability will also reduce logistics demand.

By combining the two, ***anticipatory logistics and embedded logistics***, it is envisioned that the *iron mountain* can be replaced with precision distribution.

Supply

The focus of sustainment for Urban Warrior will be to provide supplies and services to a MAGTF from a sea-base with little or no CSS footprint ashore. This will include several evolving and developing support concepts that will be carried out with ready and near-ready technologies. CSS C2 will be fully integrated into the overarching system to provide anticipatory CSS, total asset visibility, in-transit tracking, reachback to the military-industrial complex, access to urban databases, simultaneous and corroborative planning by geographically dispersed staffs and a common operating picture.

The future of supply must focus on a distribution flow focusing on efficient and precise management of resources and requirements to sustain the force — vice warehousing the mass of supplies in forward areas. As one example, a very limited supply block might be embarked afloat for initial resupply, which would be replenished through precise anticipatory CSS. Replenishment could be effected with a demand-data "reachback" capability that would link the forward-deployed MAGTF with the military industrial complex on the supply side, and with international distribution systems porviding the sustainment transportation link. The overall effect would be to greatly reduce CSSE deployed mass.

Afloat warehousing, as currently practiced, will be replaced by afloat distribution centers, with a focus on providing in-stride sustainment, or "the right stuff at the right time." Through a

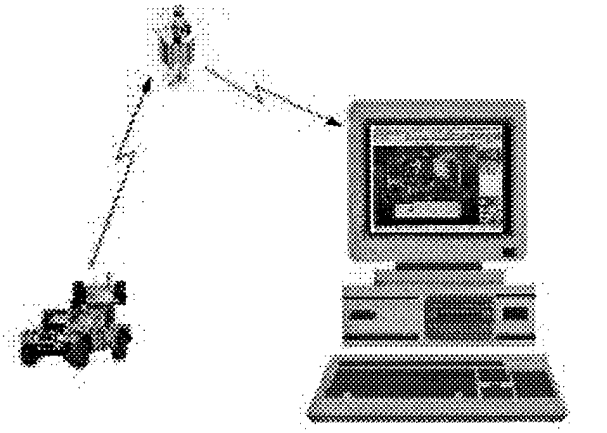
precise, anticipatory information system, the CSS element will manage the flow of supplies into and out of the afloat distribution center. Total asset visibility will allow the CSSE to know exactly where all resources are, in what quantities, what's inbound and when it will arrive. This real-time knowledge of inventory movement within the sustainment pipeline will allow for appropriately sizing the delivery means for just what needs to be delivered, and when — which is the essence of effective distribution.

Other advances leading to weight reduction of material, increased reliability of equipment and precision targeting to reduce ammunition demand will geometrically contribute to reducing mass and increasing speed of material in the distribution pipeline. Seabasing itself will reduce personnel and equipment footprint ashore leading to reduced food, water, ammunition and fossil fuel requirements.

Maintenance

The concept for future maintenance is to significantly reduce or eliminate maintenance requirements through increased equipment reliability and the remote maintenance of "sensored" vehicles. *Maintenance*, both preventive and corrective, will largely be accomplished remotely by *mechanics afloat.* Remote vehicle maintenance is a concept that has the potential of significantly increasing the operational effectiveness of forces ashore while at the same time reducing the need for warehousing space afloat. The concept envisions sensored vehicles ashore that can be monitored on a PC-based platform by mechanics afloat. The system will automatically search vehicles ashore and produce displays on the vehicle is operating.

The mechanic afloat will be able to monitor the principle indicators of vehicle systems and sub-systems, and provide graphic presentation of data such as vehicle temperature, pressures, cooling system, fuel system and battery condition. From this workstation afloat, the mechanic will adjust



Advances in computer technologies allow for remote tracking of vehicles for fuel and maintenance needs.

vehicle operating parameters when it is identified that the vehicle is operating out of specification. In many cases, the systems will be able to *self-adjust* its own equipment to optimize performance. This capability alone will greatly extend the operational readiness of the force, preventing catastrophic failures which might occur.

The mechanic of the future will be able to anticipate equipment failure so they can be either preempted or repaired promptly. Data from sensors will be matched to design standards and performance characteristics to detect trends. This will allow the mechanic to predict when catastrophic failures are likely to occur and, through digitized diagnostics and digitized technical manuals, identify the parts required to fix the failure. Parts might be ordered and received before the failure occurs.

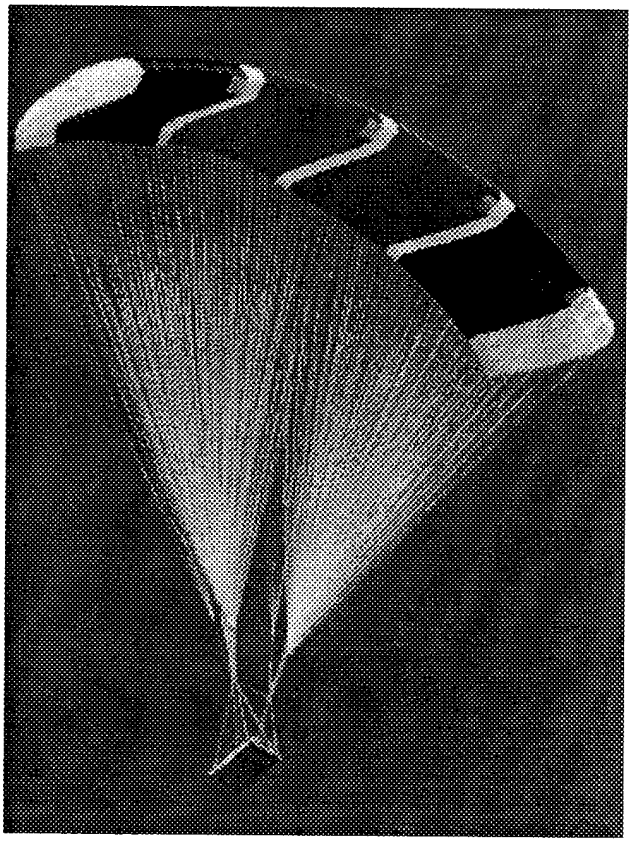
In order to reduce or eliminate maintenance contact teams ashore, future repairs to vehicles might be done by the operator. Computer-based training for the operator, to provide the equivalent of a mechanics level diagnostic ability, will allow for the parts received afloat merely to be pushed forward to be installed by the operator ashore. Likewise, computer-based training — integrated with the digital technical data and made available to the operator ashore — will provide the necessary match of equipment and skill. Additionally, a tele-maintenance capability, linked to the mechanic afloat, will provide the

operator a connection to *virtual expertise* should it be required.

Transportation

Transportation will focus on the tactical sustainment of the force. To enhance survivability and reduce exposure of assault lift assets to enemy manportable air defense systems, distribution will rely primarily on a combination of light and heavy, powered and unpowered, drone assets for ship-to-objective area delivery, as well as tactical distribution on both the extended and constrained battlefields. These will be supplemented by light surface vehicles appropriate to the urban environment.

Ship-to-unit distribution is a response to the perception that the future expeditionary battlefield will have no secure fixed rear areas such as beach heads or supply dumps. For these reasons, Combat Service Support areas of the past are no longer tactically sound. The seabased resupply of forces on this widely dispersed, non-contiguous battlefield will present significant challenges to the combat service support element and require a new generation or family of delivery systems.



The Guided Parafoil Air Delivery System (GPADS) is one of the technologies being explored by the Lab for ship to unit resupply.

Ship-to-unit distribution must adopt the philosophy of appropriately sizing the delivery system for what needs to be delivered. Particular attention must be given to the heavy lift requirement, liquids, in support of ship to objective maneuver. The CSSE must therefore possess a range of delivery systems, both manned and unmanned, that operate on the land, in the air, and at sea. Autonomous, unmanned aerial and surface delivery systems provide likely means of complementing manned vertical lift capabilities to deliver supplies ashore.

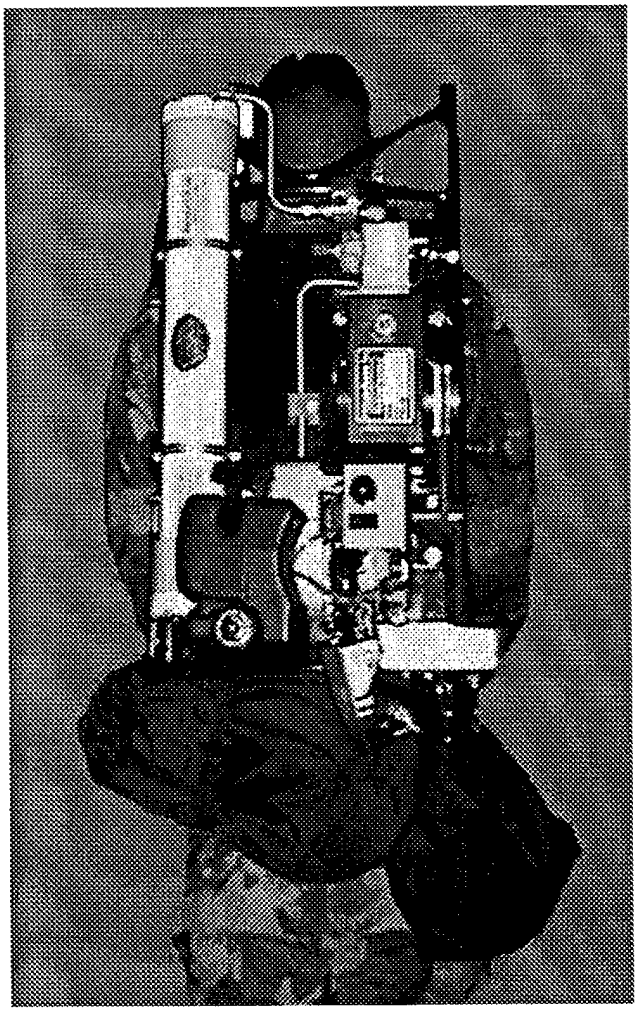
In order to augment resource harvesting, the technique of prepositioning caches of supplies might be used. These caches might be generic in nature, consisting of water, rations and batteries for the tactical systems each team carries, or specifically tailored to a specific force in anticipation of a given need at a given place and time. The cache might be emplaced by manned or unmanned delivery means or by a team clandestinely inserted. These caches must be positioned in such a way that the enemy forces are not aware of the location.

Source-to-ship distribution refers to the shipping link from the continental United States to the seabase, as well as an air link into a *near theater* land-base for subsequent transport to the seabase by theater assets. Each method has its own set of drawbacks.

General Engineering

General engineering will focus on virtual engineer reconnaissance and innovative mobility and counter-mobility tasks tailored to an urban environment.

Like maintenance, general engineering of the future will rely on embedded logistics and information in order to reduce requirements. Use of alternative non-fossil fuels will significantly reduce fuel and power requirements. Information systems which provide data on in-theater facilities —



The Portable Reverse Osmosis Water Purification Unit (PROWPU) is one of many emerging technologies being examined as part of Urban Warrior.

water, fuel and electrical infrastructure — will allow for *resource harvesting* and further reduction of general engineering requirements.

Fossil fuels represent the largest single footprint and distribution challenge for seabased logistics. Likewise, dependence on fossil fuels limits tactical mobility. Wind and solar power is a quiet, low maintenance alternatives to fossil fuel generators. Like other forms of renewable energy, wind turbines are non-polluting and are driven entirely by nature's forces. Smaller wind turbines are sometimes used to power loads directly. They can also be run together into a single power grid, such as the windmill farms at Hot Springs, California, to produce power for large applications. As technology advances, more opportunities for the application of renewable energy will appear.

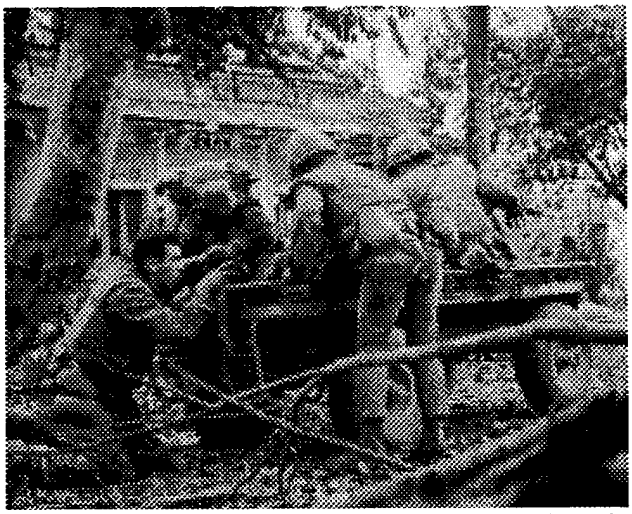
A major focus of effort for general engineering of the future will be on virtual reconnaissance. Through the use of information systems, engineers will be able to identify in-theater infrastructure such as water and electrical distribution systems, devise plans for the control or isolation of these systems without destruction, and plan for their follow-on use by friendly forces. This *resource harvesting* through information management will significantly reduce general engineering requirements specifically, and CSS requirements overall.

Expeditionary Medicine/Health Services

Expeditionary Medicine/Health Services will examine three broad areas that effect the ability of a naval expeditionary force to sustain human performance ashore. Casualty management concepts must solve the basic tension between care at the point of injury or wounding and rapid evacuation to the seabased sanctuary. Over-reliance on *care forward* results in a geometric increase in the *friction* applied to the maneuvering unit. Speedy evacuation compromises survivability. Hence, the focus of experimentation will be aimed at the proper balance between *care forward* and *evacuation* to the sea-based sanctuary.

Specifically, what is the optimal role for the individual Marine at the point of wounding? What is the requirement for resuscitative surgery, far forward, given that such a function is likely to greatly increase the footprint ashore? Given a rapid shift in tactical objective from offensive combat operations to civilian collateral casualty clearing, what relationship exists between medical assets committed and mission objective?

The second element is human performance. What are the measures of proper physical conditioning for urban operations? What are the predictors of failure — psychological as well as physical — when small units are operating continuously in widely dispersed small units? Given that a single *failure* in such small units



A Marine being worked on by a corpsman and fellow Marine during the battle for Hue City in 1968. A key focus of Urban Warrior is improving casualty management concepts. Photo courtesy of Don North.

results in a disproportionate loss of offensive power, what is the balance between the requirement to continuously press for the tactical advantage, while risking serious breakdowns in performance, judgment or even perception.

Finally, what information serves the requirement for accurate clinical data exchange between *care forward* and care rendered later in the course of treatment. In the aggregate these experiments may only serve to further focus on the complex inter-relationship between human performance and offensive power.

Services

The various miscellaneous services that the CSSE provides — from contracting food services to POW handling to postal service — will be fundamentally changed by the evolving information systems. Paper may very well be obsolete as the medium for conducting and recording the business side of military operations.

Personnel management will be handled by a *credit card* which contains a reusable memory and a microprocessor chip. This card will contain all information which can be associated with a person, from training information to medical information. This card will replace the paper records, and will be used to update data repositories within the system. Through technology such as the smart card, personnel management may become a candidate for reachback services much in the same way disbursing management is currently conducted from Kansas City, Missouri. Numerous other applications are likely to emerge for this card such as personnel manifesting, weapons custody and security.

Instrumentation

Automated instrumentation and data collection systems enable us to collect the detailed data needed to analyze and assess complex experiments in such a way that the data collectors do not interfere with the experiments. Built as separate systems, instrumentation systems are very expensive and duplicate some data that tactical systems produce. The realization that much of the data collected by instrumentation is the same as that provided by digital C4I systems offers an opportunity to reduce the cost. A concept for so doing, called *modular instrumentation*, was developed and implemented during *Hunter Warrior*. The concept was simple: use tactical systems to the greatest extent possible to gather data, and only build additional, instrumentation-only components when necessary data cannot be gathered any other way.

During the *Hunter Warrior* post-AWE assessments, analysts and operators realized that in addition to operational data being useful to the analysts, analytical data is also useful to the operators. This led to the *tactical instrumentation* concept. In this concept, instrumentation is an integral component of the tactical system, and provides instrumentation data to the commander/staff during real-world operations. Ultimately, tactical instrumentation is intended to be a "plug 'n play" system in which the units plug in selected existing components (such as MILES gear) for training or experimentation. The training components provide the simulated activities that support training realism. For example, MILES gear is used to simulate direct fire during force-on-force training or experimentation. When the unit "goes to war," the training/experimentation support components are

"unplugged" and the unit deploys with the remaining components of the system. In other words, except for training/experimentation support systems, all components of instrumentation are part of the tactical C4I system.

Full "plug-n-play" tactical instrumentation will probably not be achieved during *Urban Warrior*, but developed proof-of-concept systems for all required instrumentation capabilities will be. These capabilities are as follows. First is data communication, which will "piggy-back" on the tactical communications architecture. Position-location information will be provided by a combination of the differential GPS receivers (DGPS) in the tactical C4I system, additional "transponders" that combine DGPS position-location to the individual Marine and automatic position reporting through the C4I system, and inside-building position location instrumentation. For inside-building instrumentation, a low-cost system that pinpoints which room an instrumented Marine is being pursued. This simulates an inertial navigation system (INS) that, in combination with DGPS, provides tactical position-location information in the future. The INS will not be available in sufficient quantities in time for the *Urban Warrior* AWE so instrumentation will simulate that capability.

Both the transponders and tactical PDAs will be integrated with MILES. The experimental systems will have a low-cost means of integrating MILES that works with both existing and next-generation MILES gear. The "MILES monitors" provide two capabilities. First is the ability to monitor the live-dead status of Marines during force-on-force experimentation. Second is the ability to notify Marines "in the field" that they have become casualties due to indirect fire or air weapons. This capability works hand-in-glove with a gateway that ties into an

After Urban Warrior, the tactical instrumentation systems used for proof of concept will be available as a residual training system capability. The intent is to continue additional development of tactical instrumentation to the point that it is fully integrated into and deploys as part of the tactical C4I system.

existing simulation to adjudicate the fires of non-direct fire weapons (i.e., all weapons except those simulated using MILES gear). During *Urban Warrior*, JTS — the current joint tactical simulation for urban areas — or its follow-on, JCATS, will be used.

During *Urban Warrior*, two means for manipulating voice communications will be experimented with. The first is voice-tagging, in which voice transmissions will be associated with the transmitter's display icon on the situation awareness display. During training/experimentation, this allows evaluators and analysts to associate voice communications with the position and activities of the tactical forces during replays. For tactical use, this would provide the capability to identify and replay critical voice transmissions. The second experimental means is speech recognition. If it works, it will provide a text record of communications. Such a record is extremely useful in experiment or training exercise reconstruction and analysis. For tactical use, it could provide an automated watch log capability.

Finally, during *Hunter Warrior*, an automated data collection system (DCS) that records, stores, and sorts experiment data (e.g., position reports and text messages) was developed. This system will be used in *Urban Warrior*, but it is being improved to provide automated analysis, assessment, and display tools to speed the experiment analysis/training assessment process. The DCS will be coupled with a large-screen, high-resolution display capability for use both by experiment/exercise control agencies, and for post experiment analysis/exercise after-action reviews (AARs). For tactical use, these systems provide a capability to store, sort through and replay critical data that is not archived by other tactical systems (and to integrate and display archived data from other systems). Within the experiment/exercise control facility, either software or routing "firewalls" will be used to separate *ground truth* force instrumentation data, ensuring that the players on both sides receive only the data that would be available to them from their operational capabilities. Obviously, in a tactical system such firewalls would be removed before deployment.

After *Urban Warrior*, the tactical instrumentation systems used for proof of concept will be available as a residual training system capability. The intent is to continue additional development of tactical instrumentation to the point that it is fully integrated into and deploys as part of the tactical C4I system, and also includes plug 'n play "hooks" for attaching training systems for experiments and training exercises.

"During Hunter Warrior, we found that analytical and operational data was useful to the operators."

- **Integral component of tactical system**
- **Provides instrumentation data to the operator/staff during real-world operations**
- **Ultimately intended to be a "plug and play" system which is plugable into selected existing components**

Unit and Tactical Decision Maker Training

During *Urban Warrior,* the Marine Corps Warfighting Lab will explore current U.S. and allied tactics, techniques and procedures with the goal of developing a unit training program that will be tested and documented for implementation Marine Corps wide. In addition, it will expand on the *Clear Thinking* training that was successfully implemented during *Hunter Warrior.* This effort will focus on improving the tactical decision making skills of the squad leader leading to creation of a combat squad leader course of instruction.

Unit Training

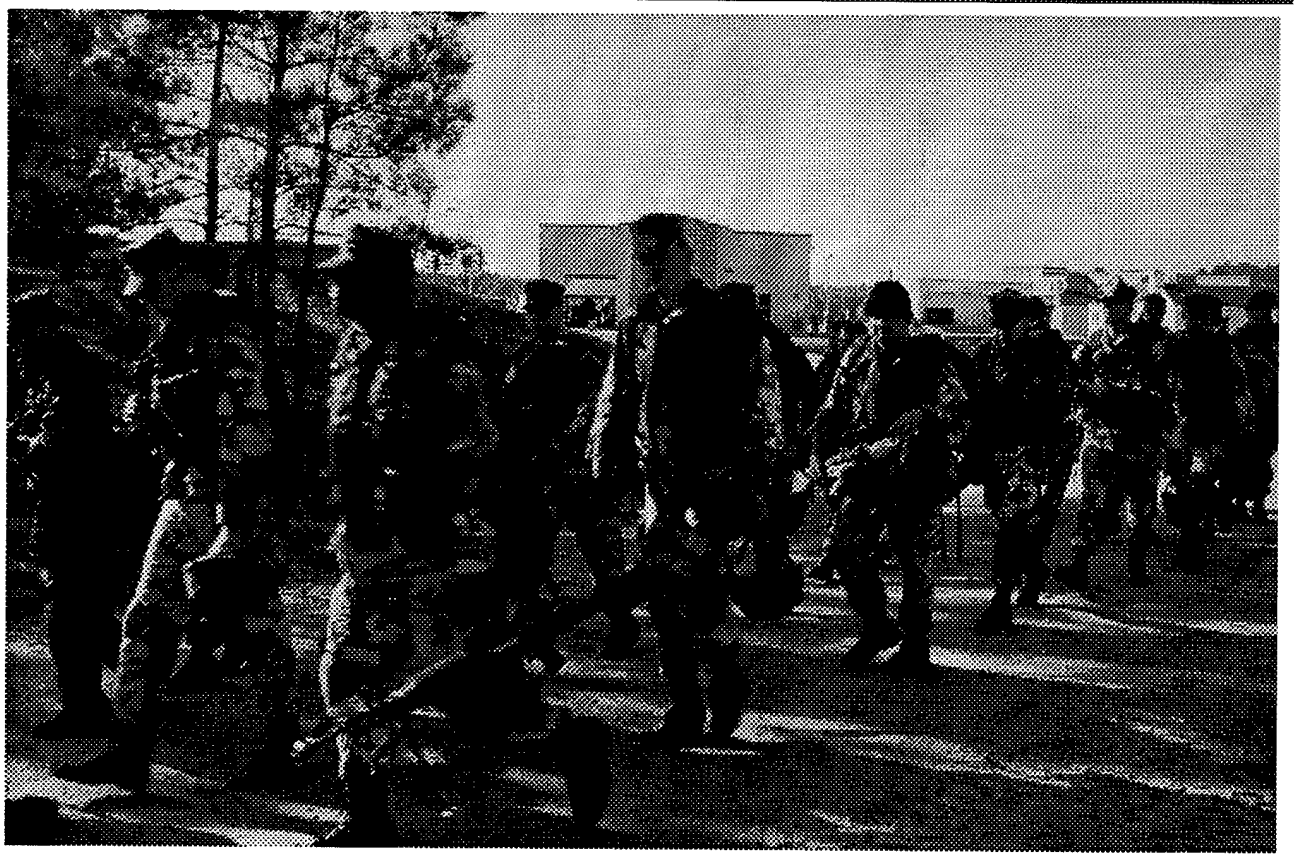
Unit training for urban operations must take a combined arms approach rather than focus solely on techniques for room clearing usually associated with civilian law enforcement SWAT training. Accordingly, future ground unit training for Military Operations in Urban Terrain must have the following characteristics:

- inherently include the combined arms approach, integrating indirect fires, air support, and the use of non-lethal technologies.
- incorporate significantly expanded combat engineer participation both in direct support of individual ground combat elements and in providing breaching instruction to infantry units.
- realistically incorporate casualty training based on the need to provide both first responder training and combat evacuation other than helicopter evacuation.
- incorporate rules of engagement training that includes specifically rapidly changing circumstances and the involvement of non-combatants.
- sniper and counter-sniper operations.
- force protection techniques to include the use of sensors in the urban defense for wide area denial.

To support such unit training, not only is the traditional MOUT facility is required but specialized training facilities that assist in developing techniques and procedures and maintaining unit proficiency are required. Some examples include:

- urban maneuver range in which chalk, paint or laser guns are used during force-on-force training operations to teach maneuver techniques and fire discipline.
- night vision ranges for the use of night observation devices in a variety of low-light conditions endemic in urban operations.
- urban breaching range for training in the use of breaching explosives but direct fire weapons against buildings and a variety of fortification materials.
- instrumented aviation urban weapons employment range.

Aviation and combat service support unit training also requires modification to prepare for future urban operations. Aviation units must specifically focus on developing situational awareness in the cockpit and employment of their systems within the urban environment. The *Aviation Combat Element Military Operations On Urban Terrain Manual,* published by MAWTS-1, provides specific guidance as to the unique characteristics of aviation operations in urban terrain. Combat Service Support units must plan and train for the specific requirements of urban operations characterized by expanded requirements for foraging for resources within the urban environment in order to reduce the footprint of logistical support needed from the seabase and requirements to repair, operate or support local infrastructure utilities, and concepts for providing forward support to engaged forces.



Marines from "C" Company, 1st Battalion, 6th Marines head for their bivouac site after one of the experimental vignettes in Urban Warrior's first limited objective experiment in January 1998. One of the goals of Urban Warrior is the development of an unit urban training program.

In addition, MAGTF staffs must be prepared to support non-government organizations conducting humanitarian relief operations and be able to respond to a host of civil affairs and combined operations challenges.

Combat Squad Leader

During *Hunter Warrior,* infantry squad leaders were given the opportunity to demonstrate how a Marine infantry squad leader — provided with experimental target identification and communication technologies, additional training in small unit decision making and the opportunity to train as a squad — could become capable of operating as a separate tactical entity. These squad leaders controlled supporting arms in a manner normally associated with specially-trained forward observers and forward air controller officers. These skills explored the potential for infantry squads to extend their offensive reach through the precise employment of supporting arms. During *Urban Warrior,* the potential contribution of the small unit tactical leader will be again be explored — employing selected technologies, additional training in tactical decision making and specially prepared squad training programs — in an effort to apply dispersed tactics in the difficult urban environment.

The objective of Combat Squad Leader training is to provide the foundation for the squad leader to assume four key roles: combat leader, small unit tactician, trainer and decision maker. The center-piece of the Combat Squad Leader course is a tactical decision making syllabus, based in part on the *clear thinking* training of *Hunter Warrior* with a special emphasis on fundamentally changing the capabilities of the infantry squad leader to operate as a tactical commander. The intent of the training is to hone the squad leaders decision making skills and ability to act as a *On-Scene Tactical Commander.* In this role, the squad leader will be expected to not only coordinate with other squads as well as higher headquarters, but to also employ support-

Squad leaders performed superbly during Hunter Warrior, calling in both indirect fire support and air strikes in a manner usually associated with forward observers and forward air controllers. The Combat Squad Leaders Course, being developed at the Lab, will emphasize four squad leader functions: combat leader, small unit tactician, trainer and decision-maker.

ing arms while directing the fire and maneuver of his squad.

As initially conceived, the Combat Squad Leader Course has four components:

- a basic squad leader tactical syllabus designed to provide combat proficiency for the squad leader in combat operations.
- an advanced tactical decision-making syllabus involving clear thinking instruction designed to improve recognitive learning, critical thinking, and risk assessment.
- a computer assisted decision making range that can be used by a unit leader to test and train squad leaders in situational decision making at the platoon and company level.
- a series of squad problems designed to be conducted at the unit level for use by the squad leader in training his squad.

The intent is that every combat squad leader in the Urban Warrior Advanced Warfighting Experiment will have successfully completed all four components of combat squad leader training.

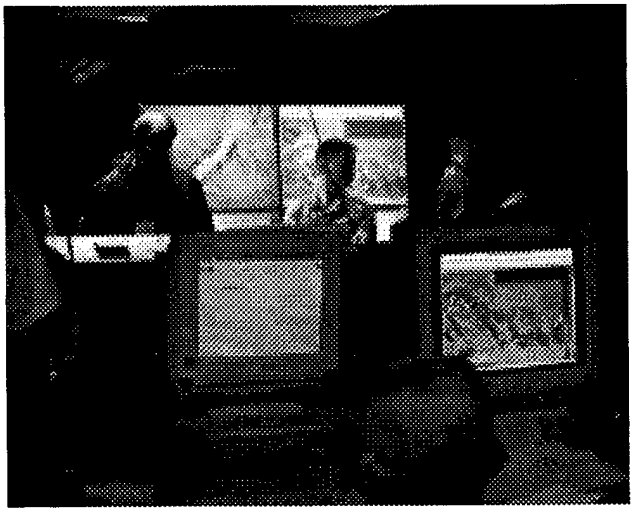
In addition, a satellite training package will be prepared for use in the Infantry Officers Course to prepare future infantry platoon commanders in the additional skills and capabilities of future squad leaders who have completed this course of instruction. This training package will provide instruction to the lieutenants on how to conduct squad training that enhances the ability of the squad leader to hone his decision making skills while executing a greater role in personally training and tactically employing his assigned squad.

Battle Captain

The increasing significance of information technologies in combat operations centers places greater emphasis on battle watch captains to assimilate information and make rapid, correct decisions in an environment of uncertainty. This skill in maintaining situational awareness and recognizing emerging patterns requires special decision making skills.

Not every officer has the inherent skills to act effectively as a battle captain. Even those that do can improve with training and familiarity. During Urban Warrior, the Marine Corps Warfighting Lab will explore techniques for screening potential officers for the unique capabilities to act as a battle captain while developing a course of instruction to hone battle captain skills and decision making capabilities.

The intent is that all battle captains to be employed during Urban Warrior — at every level — will have successfully completed battle captain training.



Future warfare will involve greater information flows and place greater emphasis on battlewatch captains' abilities to assimilate information and make rapid, correct decisions in an environment of uncertainty. The Lab is developing a course of instruction to hone battle captain skills and decision-making capabilities.

Interoperability

It is unlikely that U.S. naval expeditionary forces will undertake unilateral operations in the future in the mid- to high-intensity level of war. While the likelihood of unilateral action in low-intensity operations, such as peace-keeping or humanitarian operations, is greater, it is probable that those operations will be conducted as part of a coalition or under the direction of the United Nations, NATO or other regional alliances. In addition, combined LOEs will be conducted in the U.K. involving Warfighting Lab personnel and equipment and Royal Marine/British Army units and a Royal Marine unit will participate in both the Urban Warrior culminating phase experiment and AWE.

The British Royal Marines and other coalition forces are participating in Urban Warrior experimentation.

To ensure future combined or coalition operations are prosecuted effectively, developing capabilities must continue to complement those of our allies. The results of experiments must at least provide our allies, so they have knowledge of experimental successes and setbacks. When mutual benefits are identified, we must encourage more positive interaction with our allies, must be encouraged and the active involvement of allies in the collaborative, coordinated and combined experiments must be pursued.

Our allies will not be persuaded to duplicate results in their forces. The aim is to give allies insight into the results of the Sea Dragon process so that they are aware of the future shape and direction of American naval expeditionary forces. By dovetailing respective capabilities and shortcomings with those of our allies the potential capabilities of combined or coalition naval expeditionary forces in the future will be maximized.

Urban Warrior Experiment Plan Summary

Urban Warrior will be conducted in two phases and along six experimental tracks. The first phase will be conducted primarily on the East Coast with II Marine Expeditionary Forces and will end in September 1998 with a Culminating Phase Experiment. The second phase will commence in October 1998 on the West Coast with I Marine Expeditionary Force and will terminate in an Advanced Warfighting Experiment on the West Coast during the Spring of 1999.

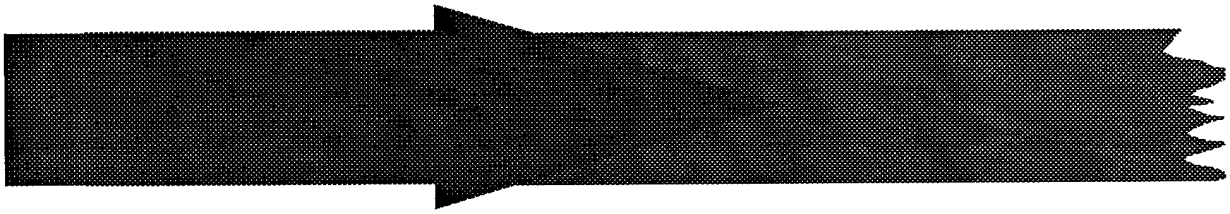
The first phase will focus on developing urban capabilities involving tactics, techniques and procedures (TTPs). Equipment and technology enhancements will be incorporated where feasible to significantly improve urban operating capabilities. In the process, particular attention will be placed on evaluating current Marine Corps training for urban combat and the development of a revised training program to be used in enhancing training for Marine operating forces.

The second phase will expand the first. It will apply the advanced urban warfare TTPs developed in Phase I to seabased urban operations using the refined ECOC. Limited objec-

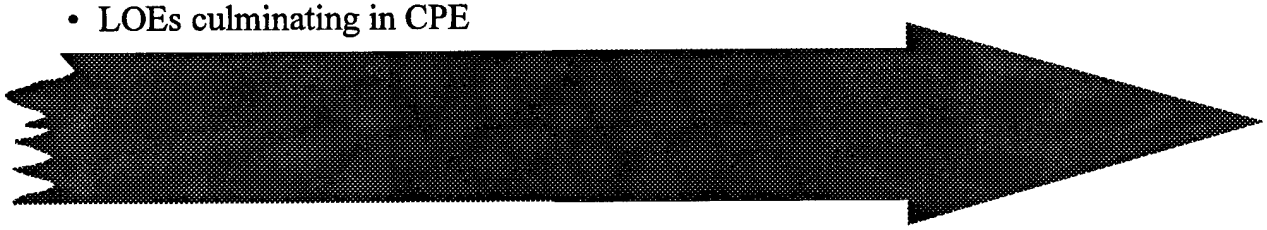
tive experiments during this phase will be designed to further refine operational capabilities and to prepare for the Urban Warrior Advanced Warfighting Experiment in conjunction with Fleet Battle Experiments and the integration of Extended Littoral Battlespace Advanced Concepts Technology Demonstration (ELB ACTD) technologies.

The phasing of Urban Warrior is designed to define the focus of main effort. Urban Warrior LOEs and other related capability development initiatives will be conducted during both phases using East and West Coast operating forces and reservists. The ultimate objective of the phases are to effectively and efficiently develop the capabilities to be incorporated into the Urban Warrior AWE as potential enhancements for sea based expeditionary forces operating in the urban littoral.

Simultaneously with exploration of the TTPs during Phase I for urban operations and the incorporation of the refined ECOC during Phase II, the Marine Corps Warfighting Laboratory will develop warfighting capabilities in the following six experimental tracks: (1) C4I, (2) Seabasing, (3) Aviation, (4) Urban Fighting, (5) Fires and Targeting, and (6) Instrumentation. Note that these tracks have been discussed in detail in sections V, VI and VII and address both continued exploitation of *Hunter Warrior* experimentation as well as development of selected capabilities needed to support *Urban Warrior*.



- **Develop TTPs**
- Develop specialized capabilities
- Refine ECOC technologies
- LOEs culminating in CPE



- **Experiment with refined ECOC**
- Apply advanced TTPs
- Seabased urban operations
- LOEs culminating in AWE

Urban Warrior will be conducted in two phases with the emphasis shifting from the East Coast in Phase I to the West Coast in Phase II.

Implementing the Results of Experimentation

With the creation of the Marine Corps Warfighting Lab, experimentation has become one of the primary means for the identification of warfighting requirements within the Combat Development System (CDS).

Previously, requirements were primarily drafted as a result of lessons learned. Accordingly, requirement documents have tended to focus on improving current doctrine and warfighting capabilities rather than identifying opportunities for new capabilities as a result of emerging technologies and conceptual thinking. Although maintaining a system that carefully and effectively assimilates improvements is important, the rapid rate of change technologies invites an increased focus on identifying early potential opportunities for military capabilities. This effort requires close coordination between the various MCCDC staff sections, MARCORSYSCOM program managers, and the Lab *before, during* and *after* experimentation.

Before experimentation, coordination is required to identify capabilities to be developed in support of the warfighting concepts. Where possible, systems under development by MARCORSYSCOM that have the potential to deliver desired capabilities are identified as experimentation candidates and sufficient prototypes or surrogates acquired to support experimentation. Alternative commercial candidate systems, equipment and technologies may be required if there are no systems under program development. Where there is a probability that experimentation will yield a requirement, IPTs made up of MCCDC (WDID and Requirements), MARCORSYSCOM, and the Lab should be established.

During experimentation, close coordination is required between MCCDC staff sections to ensure the implications of experimentation are fully assessed and the impact on Doctrine, Organization, Training & Education, Equipment, and Support (DOTES) — as well as future Concepts — are captured and rapidly implemented within the CDS. Close coordination is required not only during major experimentation events such as AWEs, but also other limited and technical explorations conducted in preparation for AWEs.

After experimentation is completed, close coordination is required to implement the findings from the experimentation. These findings may include analytic data collected by the Lab, subjective assessments by official observers, and the specific recommendations of an integrated DOTES Assessment Team that should be on hand to carefully observe and assess the results of experimentation. In addition, post experiment coordination is required to determine the need for follow-on experimentation and implementation actions. Those actions need to complete follow-on assessment within the CDS leading to changes in the POM and DOTES.

Advanced Warfighting Experiment (AWE)

The Urban Warrior AWE will be conducted on the West Coast by I MEF and 3d Fleet operating forces during March-April 1999 under the umbrella of the 1999 Kernel Blitz joint exercise. It will be sea based and will be conduced in a series of locations designed to experiment with a range of capabilities under a variety of urban conditions. Like *Hunter Warrior,* it will be conducted in coordination with a Fleet Battle Experiment. In addition, it will be used by the Extended Littoral Battlefield ACTD as a primary demonstration of their new technologies.

The following is a draft hypothesis for the AWE: ***Can we significantly increase the ability of forward afloat forces to execute simultaneous, non-contiguous operations in both the extended and constrained urban battlefields to include: (1) penetrating and operating in the dense urban battlefield, (2) operating in critical areas of the extended battlefield on the approaches surrounding dense urban areas, (3) dealing with weapons of mass destruction, and (4) seabasing the bulk of support capabilities including C4I, and sustainment.***

The AWE scenario will be based on current planning scenarios for I MEF and 3d Fleet forces and will be developed to explore the range of naval capabilities associated with future naval expeditionary forces in the 2010 time frame. It will explore naval capabilities in a joint context but focus on potential naval operations as initial response to a regional crisis before a supporting joint infrastructure has been developed. Accordingly, it will focus on sea based capabilities associated with forward presence forces — ARG/MEU(SOC) and carrier battle group — with augmentation from early arriving forces such as the MPF and land based Marine aviation.

It may incorporate both live fire and force-on-force events — some of which may be off-set to air ranges at MCAS Yuma or MCAGCC Twenty-nine Palms, California. Live fire events will be designed to explore the coordination of precision delivered indirect fires. Force-on-force events will have specific objectives and will involve the personnel playing the role of noncombatants. In addition, some phases will focus on the employment of non-lethal weapons, response to the employment of chemical or biological weapons, sea-based logistics delivery into the urban environment, sea-based tactical UAVs, expeditionary *first responder* medicine, and the use of COTS radios for reliable and secure tactical communications at the battalion level and below within an urban environment. All phases will have as a major goal the rapid and effective dissemination down to and between dispersed, independently operating small units as a primary enabler of opportunistic coordinated actions. The ultimate objective of the AWE is to explore advanced capabilities for naval expeditionary force operations in the urban environment and then to immediately exploit the experience of the AWE by exporting capabilities into operational experimentation in a deploying ARG/MEU(SOC) — beginning in the summer of 1999.

"Urban Warriors"

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IN REPLY REFER TO
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21 April 98

From: Commanding Officer, Marine Corps Warfighting Lab, Marine Corps Combat Development Command, 2042 Broadway Street, Suite 201, Quantico, VA 22134-5096
To: See Distribution

Subj: URBAN WARRIOR CONCEPTUAL EXPERIMENTAL FRAMEWORK , VERSION 1-5

1. In the last three years, experimentation has become the principal means for identifying future Marine Combat capabilities. The Sea Dragon experimentation process begins with an assessment of future context and what conditions may lie ahead. The Marine Corps Warfighting Lab translates that context into concepts for employing forces. In turn, the concepts are broken down into essential capabilities. These are the grist for the Urban Warrior series of experiments. Reflecting this logic, the Urban Warrior Conceptual Experimental Framework presents the urban warfare concepts and enabling capabilities that we believe should guide experiment-based development of naval expeditionary operations on the urban littoral.

2. A word on technology. As we prepare to embark on joint experimentation the premium on clear thinking and rigorous analysis grows. I purposely didn't mention it in the first paragraph, but if anything is certain about the future, it is that we will face a bewildering array of technology choices. Choosing intelligently demands an understanding of future context and concepts. These give us logical backboards against which to bounce various technology alternatives and make operationally sound choices.

4. The fifth revision of the Urban Warrior experimental framework has been reformatted to include photos and diagrams. It remains a draft. It may be updated yet again, based on the results of experimentation or to incorporate additional experimentation opportunities.

Anthony A. Wood

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Colonel, USMC

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